DOCUMENT RESUME

ED 099 948 CS 500 944

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TITLE Communication. Earth 2020 Workshop.
INSTITUTION Hawaii Univ., Honolulu.
SPONS AGENCY National Aeronautics and Space Administration, Washington, D.C.
PUB DATE 74
NOTE 74p.; Marginal reproducibility; Not available in hard copy

EDRS PRICE MF-$0.75 HC Not Available from EDRS. PLUS POSTAGE
DESCRIPTORS *Communication (Thought Transfer); Communications; *Course Descriptions; *Curriculum Planning; Higher Education; Speech Curriculum

ABSTRACT

This course guide on communication contains a preselected package of resources (i.e., films, books, models, charts, strategies, etc.) in an attempt to provide the framework for integrating communication with other disciplines. Five chapters include: (1) Moving Information vs. Moving Matter; (2) Transportation: Moving People to Experience; (3) Telecommunication: Moving Experience to People; (4) Designing an Effective Communication System; and (5) Areas of Concern: Control and Evaluation of Communication. Each chapter outlines the specific goals and objective methods of the lesson. A bibliography is supplied, as well as an instructional flow chart suggesting a possible sequence for organizing the material. (TS)

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communication

EARTH 2020 Workshop
Visions For Our Children's Children

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INSTRUCTIONAL FLOW CHART

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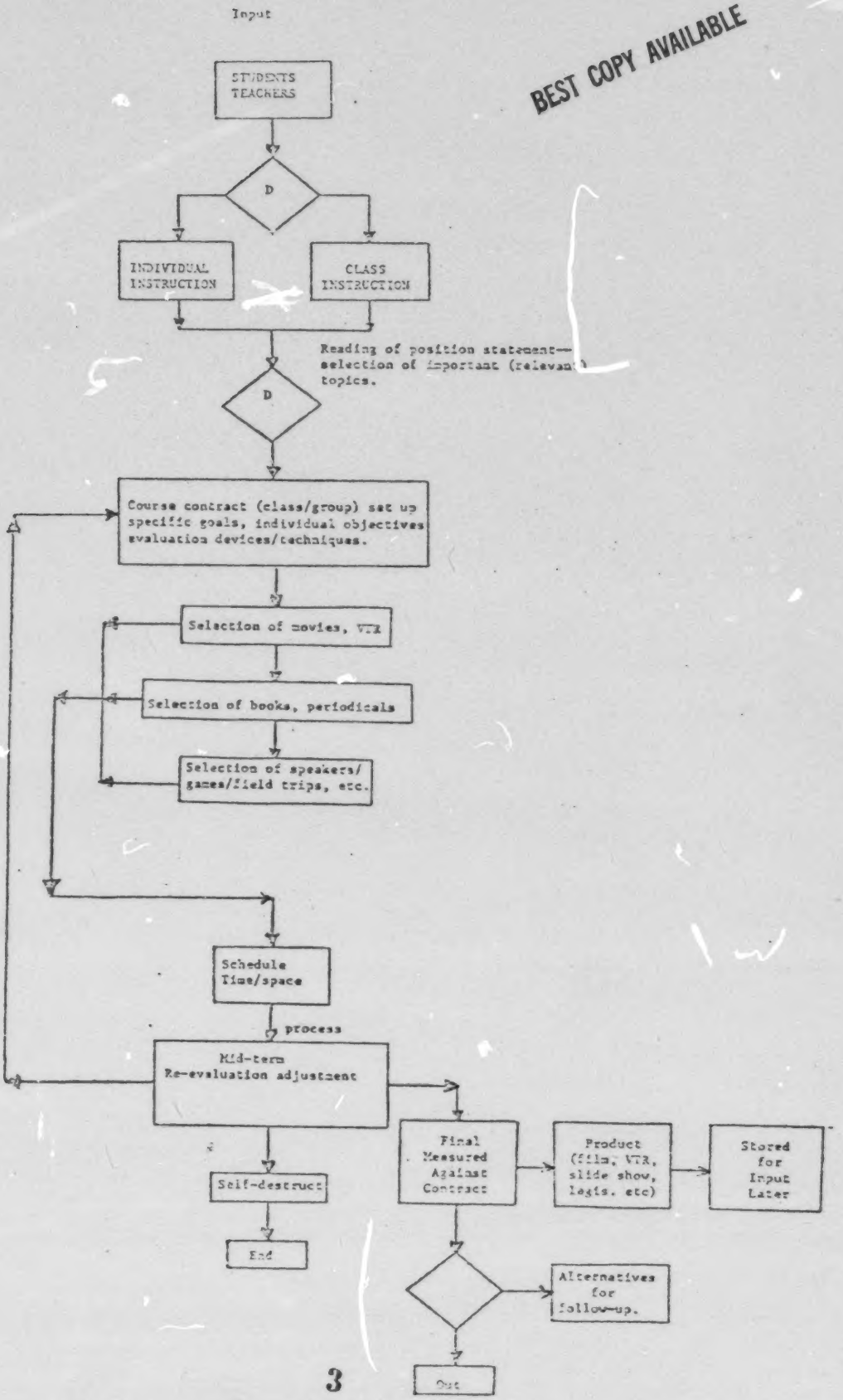

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I. Moving Information vs. Moving Matter

Goal: To introduce the concepts, similarities and the possible trade-offs between communication and transportation.

Objectives: After the student
1. views selected films;
2. reads selected material;
3. discusses/answers posed questions;
he or she will orally define communication and transportation.

II. Transportation: Moving People to Experience

Goal: To describe the "general characteristics" of transportation and its systemic relationship to individuals, cultures and societies of the past, present and future.

Objectives: The student will demonstrate the "general characteristics" through
1. selecting and completing three of the "asterisked" strategies;
2. discussing/answering the posed questions in groups;
3. synergy/serendipity.

III. Telecommunication: Moving Experience to People

Goal: To describe the general characteristics of communication and its relationship to individuals, cultures and societies.

Objectives: The student will demonstrate the general characteristics by:
1. selecting and completing three of the "asterisked" strategies;
2. discussing/answering group posed questions;
3. synergy/serendipity

IV. Designing an Effective Communication System

Goal: To identify and specify some of man's basic physical and psychological needs (desires) and incorporate them into the design of a communication system.

Objectives: The student will identify some specific physical and psychological needs by
1. selecting three of the "asterisked" strategies;
2. discussing/answering group posed questions;
and will design one communication system incorporating these needs.

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V. Areas of Concern: Control and Evaluation of Communication

Goal: To identify or invent methods of controlling and evaluating complex information (communication) systems in terms of human needs and desires.

Objective: The student will identify the methods by:

1. selecting and completing three of the "asterisked" strategies.

The student will design specific human oriented controls over privacy and right to information concerning their previously designed communication system.

VI. Appendix

Containing pre-selected
- charts
- graphs
- models
- glossary of terms

VII. Bibliography

All entries pre-selected and in some cases annotated by contributing personnel.

PREFACE

The purpose of this unit on communication is to provide a pre-selected package of communication resources (i.e. films, books, models, charts, strategies, etc) which can provide the framework to integrate other disciplines could include philosophy, psychology, economics, physics, sociology, futuristics, engineering, energy, education, etc. Along the communication/transportation statement in this unit are some teaching strategies (by no means complete) which are clearly marked by asterisk (*) in the resources column. In addition to these strategies are specific books, films, graphs, models and games which can be selected as learning "pathways" for different disciplines.

The unit can be utilized in many ways: as a communication unit (course), which lends itself to team and individual teaching techniques. These can be adapted to include the individual student as well as small and large groups. The unit can provide an "interdisciplinary menu" which lists relevant, teacher selected, materials which can be utilized by students in plotting individual or group learning paths.

All reference material included has been carefully selected and provides a substantial core of materials in the specified areas. The methods, or approaches used in presenting this material can (and should) vary. A general "instructional flow chart" follows: it suggests a possible sequence for organizing the material. All subsequent activities should center around the specific learner/learning environment.

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Discussion

Introduction

There are over one hundred different definitions of the term "communication". These range from very narrow specifications of certain types of electronic, chemical or human behavior to very broad generalizations which encompass everything under the headings of culture, society, science and technology. Almost all of the definitions, however, stress the element of "interaction" or "unification", the bringing together or sharing together of two elements of systems in order to exchange information (from the standpoint of intent or purpose) or as a result of which information is exchanged (from the standpoint of effect or consequence).

For human beings, communication thus includes at the very least locomotion and language--or, more basically, walking and talking. These two activities and all the various modifications and extensions which have been developed to extend their speed, power and range are what we usually include under the term "media". But, more broadly interpreted, the term "communication" can also be seen as referring to such things or events as the molecular interaction that occurs in the transmission of "genetic messages" from DNA molecules to RNA molecules or the changes in the seasons which "signal" to birds the proper time to migrate south for the winter. These and many other examples might be cited to expand the concept of communication beyond the human level of media.

For the purposes of the following discussion, therefore, let the term "communication" be broadly understood and defined as

Questions & Observations	Resources & Projects
How many different things does the term "communication" mean to you?	Dance, F. "The Concept of Communication" Harms, L.S., Intercultural Communication, pp. 1-45. Fabun, D., "Communication" Pierce, J., "Communication" Sereno, K. and Mortenson, C., eds., Foundations of Communications Theory
	Harms, L.S., Human Communication: The New Fundamentals
How do different modes of transportation and telecommunication--media--extend human experience?	McLuhan, M., Understanding Media: The Extentions of Man
	Film: Communications Primer
Can two computers "communicate" with one another?	
Is "photosynthesis" a type of communication?	
Do you know what "teleportation" means?	
What might some of the problems be that could hinder Human communication with animals, plants, or some form of extra-terrestial intelligence?	Harms, L.S., Intercultural Communication, pp. 113-126

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follows: Communication is any interaction between or union of two or more organic or inorganic systems as a result of which the state, status, mode or behavior of one or more of those systems is modified. Although this definition includes many types of non-human interaction and unification, the following discussion will focus, for the most part, upon those two types of communication which human beings have historically had the most control over: telecommunication and transportation.

I. Moving Information vs. Moving Matter

Since the definition of "communication" to be used in this discussion includes the transfer of matter--i.e., transportation--as well as the transfer of information, it will be helpful to further define these two subcategories of communication:

A. Transportation is any interaction between or union of two or more organic or inorganic systems as a result of which one of more of those systems is physically relocated in space and/or time.

B. Telecommunication is any interaction between or union of two or more organic or inorganic systems as a result of which the state, status, mode or behavior of one or more of those systems is modified by means of a transfer of information-bearing signals or symbols.

In discussing these two alternative types of communication, the focus will be primarily upon the tradeoffs involved in choosing one means or the other or a balance in order to facilitate human interaction. The basic problems of specifying such tradeoffs will be introduced and some possible alternatives will be suggested.

Questions & Observations

This is only the definition we have come up with to suit the purposes of this discussion; How would you define communication to suit your concept of it?

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What are some examples of "organic" and of "inorganic" modes of transportation?

What are some examples of "organic" and "inorganic" modes of telecommunication systems?

What are the "signals" by means of which human beings communicate?

Resources & Projects

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Fabun, D., Telecommunications

Film: Of Men and Machines

II. Transportation: Moving People to Experiences

Culture and societies are a result of people getting together for their individual and collective benefit. Many things are possible for a group of people that are impossible for single individuals acting alone. Until very recently in human history, the only means of bringing people together was transportation, i.e., physically moving human beings from one place to another. One could hear about or read about something after the fact as a result of language very early in man's period on the earth, but achieving even the most rudimentary form of first-hand experience of someone or something has always required one to move bodily to the location of the experience.

On a world-wide basis, walking has been and still is the primary mode of locomotion for human beings. The need to move increasingly long distances and to carry ever larger loads for social purposes such as war and trade, however, has resulted in a long series of technological innovations developed by man to assist him in his task of moving himself and his possessions from one place to another. Man has used beasts of of burden (both animals and other man, slaves), floating materials and water, wheeled vehicles and pathways, and winged vehicles and the air --to name but a few--all for the purpose of facilitating his desire and need to move about from one place or experience to another.

For the most part, it has been individuals who owned and operated their own means of transportation. However, as noted above, groups of people working together can often accomplish a task move effectively than individuals working alone. Hence, group transport systems arose which employed one group of people operating a mode of locomotion for the convenience of another group of people. Shipping companies, wagon-trains, stagecoaches, railroads, busses and airlines are all examples

Questions & Observations

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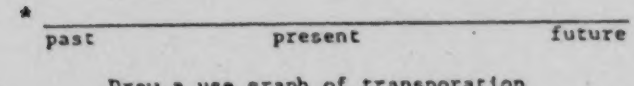
What are some of the more important means of transportation developed by man throughout history?

Which types of transportation would you call "personal" or "private" transportation and which would you describe as "public transportation?



Draw a use graph of transporation technologies

Resources & Projects

-3-

Mead, M., Culture and Commitment

Harms, L.S., Intercultural Communication

Project: Do some historical research into some of the claims made about human interaction on this page.

Film: Rise of the American City

Film: Transportation is Moving

Film: The American Road

of this "public" or "mass" transit approach to bringing people together to share experiences.

In most times and places, it has been cost which has determined the mode and availability of transportation. In cases where people spend a large part of their labor on food and shelter, there is neither the money to own a personal mode of transportation (outside of that needed for one's work) nor the time to use such a mode of transportation to go off on trips to other places. Hunters, farmers and soldiers need horses and wagons to carry out their tasks in society; it is much more a matter of survival than of convenience.

In the case of the more affluent people in a given society or, more recently, of the affluent nations of the world, convenience and luxury have often dictated the type of transportation as much as cost. In poor countries, people must either walk or rely upon public transit for moving about; but in countries like Germany and the United States and Japan, many more people can afford to own a personal vehicle. These POV's (privately owned vehicles) are almost never efficient from a cost-benefit standpoint, but they offer both convenience and social status by giving one almost complete freedom of choice as to how, when and where one will travel about. The POV in the more affluent countries is used almost as much as a toy as it is as a tool, and the symbolic value of owning a POV--be it a bicycle, a motorcycle, an automobile, a boat or a plane--is such that arguments based upon efficient energy utilization and cost-benefit analysis are often considered irrelevant to the primary reasons for owning and operating a POV

Much long-distance movement and almost all intercontinental

Questions & Observations

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How much time do you use your car or bicycle for work or commuting and how much time for recreation or enjoyment?

How much does it cost to operate a car per year? A bus? A bicycle?

When the North Koreans captured the crew of the USS Pueblo in 1968, they beat the crew members for lying when they claimed they owned their own cars back in the US. The North Koreans claimed that President Johnson owned all the automobiles in America. Why do you think people could be led to believe such a thing?

In what ways do people use cars for playthings?

Resources & Projects

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Film: The City--Cars or People?

Project: Use the AEC "Energy Handbook" to calculate some of the energy efficiencies of the various modes of transportation.

Mooz, W.E., "Transportation and Energy"

travel, however, are still beyond the means of all but the most affluent members of most societies. Hence, the need for modes of public transit such as ship lines, airlines and railroads is still great. Also, as groups of people coming together in one place such as cities and exhibitions become ever larger, the cost and convenience of POV ownership and operation becomes increasingly prohibitive. Thus, there is an increasing demand for fixed-guidway and bus systems to service the growing metropolises of the world. Likewise, as cities become more dense, building upward and downward as well as outward, the demand for more public, short-distance transportation such as elevators, escalators and moving walkways also becomes greater.

The tradeoffs between do-it-yourself POV transportation and socially or privately operated public transportation is almost strictly one of convenience versus cost. Given equal costs, people will almost always choose a POV form of transportation over a PT (public transit) form of transportation. This is true even if POV transportation costs more than PT transportation, but only up to a certain point. This cost must be figured both in terms of time and money. As long as materials and energy are cheaper than human labor, people will tend to purchase machines which they can operate themselves rather than paying for the services of others to accomplish the same ends. Likewise, in the sense that time is money for many people, the speedier modes of transportation will overcome the slower modes. Planes will replace boats and trains, and cars will replace busses.

It is only when costs in time and money shift that modes of transportation shift. New technologies in transportation continually

Questions & Observations

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What are some of the choices of mass transit available where you live?

What are some of the costs of owning and operating an automobile?

Why are bicycles becoming more and more prevelant in America?

What are some of the reasons that even more bicycles aren't around in America? What keeps us from going over to this mode of transportation 100%?

What effect would social engineering have on transportation?

* Design an alternative living/working area.

Resources & Projects

-5-

Jones, D., Communications and Energy in a Changing Environment
Hall, P., The World Cities

Enns, J., "Changes in Urban Form from Transportation System Changes"

Project: Organise a field trip to one of the local bus, cab or mass transit rail facilities.

speed up the modes of transportation but they are often self-defeating advances, since 1) they use more energy and materials in many cases, and 2) they often move so many people to one place so fast that the crowding at the orientation and destination places undercuts the time saved in the transportation. In many cases, it is faster to take a train or a bus from one city to another, even though the trip is 4 or 5 hours long, than it is to commute to an airport, check in an hour early for a flight, board the plane, fly to the destination airport, wait for baggage, and commute to the destination home or hotel.

As energy becomes more expensive, bus, train and boat travel will once again become increasingly viable modes of public transportation. Likewise, as airports become more and more crowded, bus and rail travel will become more viable for the short-run intercity trips. Convenience too has its price and, while the symbolic values placed on some modes of transport by social status will continue, economic values will ultimately regulate both the modes and the availability of transportation. This being the case, both POV and PT modes of transportation will move increasingly toward more automated and energy-efficient equipment. If energy and materials become too overwhelmingly expensive, there may be even a move toward more labor-intesive modes of transportation once again.

It seems necessary to ask, however, what special dimension is added to the communication process by the proximate physical interaction between people and other people or between people and other types of experience. Recent advances in electronic communication and information technologies and theory make it possible to move experiences to people. Hence, is it really necessary in a

Questions & Observations

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How might the government's power to tax various types of transportation and to support other types with loans affect the use of one mode of transportation over another and the overall balance in a region's or nation's transportation system?

What are the inconveniences you encounter in attending a professional football or baseball game that you would not encounter if your remained home and watched the game on television? What are some of the advantages of attending the game in person?

Resources & Projects

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Rice, R. "System Energy and Future Transportation"

Project: Field trip to airport to watch baggage handeling processes.

Mooz, W.E., Energy Trends and Their Effect upon Transportation

Bagdikian, B., The Information Machines: Their Impact Upon Societ.

Film: Communications--The Wired World

society or a world which is based upon interpersonal interactions between various members of the social or national groups to spend such a large amount of time and money actually moving the people themselves around, when the potential exists to accomplish the same interactions via telecommunication?

III. Telecommunication: Moving Experiences to People

A for the most part already available or feasible, technologically sophisticated telecommunications network could serve an entire society as a public utility. It could link home, office, school and store together into a living environmental organism not unlike the nervous system of a human being. Plato said that "society is man writ large" and using the nervous system of the human body as a model for a communications system for society or for the world would probably prove very efficient and have considerable survival value for mankind.

Such a sophisticated telecommunications network could extend man's total awareness from his individual consciousness to a global consciousness of the entire world around him. There is no reason why such a communications network could not accomplish almost all of what is accomplished today through transportation; and several environmental and economic problems suggest considering such a network not just as a future alternative approach to total communication, but as the only type of communication that will be a viable alternative in the future.

The U.S., if not the whole world, is facing an energy shortage. The present, fossile fuel supplies of the earth are limited and, in a long-run perspective, surely exhaustible. Alternate energy sources such as thermoneclear fission and

Questions & Observations

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How is your "consciousness" already expanded by the use of TV, radio, telephone, etc.?

Resources & Projects

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Film: Computers--Challenging Man's Supremecy

Smith, R.L., The Wired Nation

Neumann, J., The Computer and the Brain

Cherry, Colin, World Communications: Threat or Promise?

Hinchman, W.R. & Dunn, D., The Future of Satellite Communication

McLuhan, M., Understanding Media: The Extensions of Man

McHale, J., World Facts & Trends

Rice, R., "System Energy and Future Transportation"

Meadows, D., The Limits to Growth

Hammond, Metz & Maugh, Energy and the Future

fusion, solar energy and geothermal energy are at various stages of development, but energy supply is not the only problem. The phenomenon of heat dissipation as a result of energy conversion may have considerable, long-term environmental and ecological impact. The temperature changes resulting from too much of an increase in such heat dissipation could have globally catestrophic effects. The degree of confusion still existing in the scientific community with regard to this problem can be seen from the predictions that such a temperature change might lead either to a new ice age with the polar ice caps extending down towards the equators or to a "greenhouse effect" which would melt much of the polar ice caps and inundate much of the coastal land of every continent.

Yet, it should be asked why it is necessary to utilise so much energy in the process of achieving human interaction. By the year 2000, estimates on world population range from 5.5 to 7 billion. Especially in the U.S. and Europe, this increase will be accompanied by an increase in the number of automobiles and vehicle miles; in the U.S., this will mean that by 1980 almost half of the needed oil requirements will have to be imported. If the projected number of vehicles in the U.S. reaches 120 million by 1980, congestion on the roads, air and noise pollution and traffic fatalities will probably reach unacceptable levels unless some sort of drastic social or technological "turnabout" occurs to reduce the per-vehicle contribution of these problems.

The most obvious solution might seem to limit the growth of transportation services and facilities, but this will also result in a limitation of communication that might be equally detrimental

Questions & Observations

* Demonstrate the cause/effect (input-output) relationship of energy and heat.

Why Might increased energy use and heat dissipation have such drastically different effects?

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Resources & Projects

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AEC, "Energy Handbook", p. 15.

Film: U.S.A.--The seeds of Change

McHale, J., World Facts & Trends

to society and human survival. A more enduring solution would be not to limit the number of cars and highways or add more laws and restrictions to transportation, but to shift gradually away from so great a dependence upon transportation toward a more systematic utilization of a telecommunications network as an alternative to locomotion.

In many situations person-to-person communication can be achieved effectively without the participants being physically proximate to one another. Physical presence for much of our daily communications activity is a learned need and perhaps not an essential one. Information and experiences can be moved to people, but habit and inefficiently developed communications systems require the majority of humans to bodily transport themselves to the scene of most interactional experiences. In many instances the individual either drives or is driven in an expensive, energy inefficient vehicle over dangerous, crowded highways, in stress causing traffic to a place of work, only to spend the major part of the day talking over the telephone, sending or receiving verbal and written messages, and undertaking research or decision-making processes in isolated offices--all of which could be accomplished for the most part remotely. In the present system, it is (sociologically) mandatory for each individual to be physically present at his or her place of work most of the time, even though much of that "time" is spent working alone.

It seems to go unnoticed that much of the interaction which takes place is accomplished via memo, dictating machines, remote control of electronic equipment, and intercom or telephone conversations. It seems to make little difference to the activity of telephoning whether the parties are only rooms away or continents

Questions & Observations

* Do a personal time/motion study. Compare with
  a. other individuals
  b. large groups
  Draw some conclusions.

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How many of your current daily activities do you think you could perform from your home if you had a good 2-way communications setup?

What is the average milage you drive to and from work per week?
How many hours per week do you spend commuting to and from work?
How many vehicles do you own?
How many lanes of highway are there on the main route you use to get to and from work everyday?
How much extra money would you make each week if you were paid for the time you spent commuting?
How often do you encounter traffic jams while commuting?
What percentage of your daily work demands face-to-face interaction?
What percentage of your time do you spend talking on the phone at work? Writing letters? Listening to or dictating tapes?

Do you enjoy driving--i.e., is it more than just a task for you?

How much time do you spend looking for a parking place when you go to work or shopping on the average?
How much does it cost you to park on the average?

How much of your time is spent working or relaxing alone?

Do you work better alone? Or with many people? Would you like a private office?

How far is the nearest mass transit stop from your home? From work?

Resources & Projects

Film: The Communication Explosion

Film: The Communication Revolution

Baran, Paul, "Potential Market Demand for 2-Way Information Services in the Home, 1970-1990"

Kato, McHale & Lerner, Communication and the City: The Changing Environment

Film: Time Piece
Film: Two Men and a Wardward

Project: Find out how much one cubic foot of concrete costs. How much a mile of 4-lane highway costs to build on the average.

Film: Thinking Machines

Project: Experiment with a homemade telegraph or some old Army surplus field telephones. See if it is any faster to carry a message from one room to another than it is to telegraph or telephone that message electronically? Is is as efficient as hand carrying it?

Project: Figure out the true cost of owning and operating a car in your area for one year. Include taxes, gas, tires, repairs, insurance, parking, etc.
Compare this cost to the cost of using mass transit for one year.

away from one another. If memo and letter dictation can be accomplished over the phone "in house", then they could just as easily be undertaken telephonically from remote locations; the dictation unit or the secretarial pool does not really care whether the memo or letter orginates fifty feet or fifty miles distant. The transcribed letters could just as easily be electronically transmitted to home computer terminals as carried from steno pools to upstairs offices.

Now and increasingly in the future, time and information are valuable resources, yet each morning and evening the present telecommunication/transportation system requires that most people spend 20 minutes to 2 hours commuting to and from their places of residence, work, education and recreational or commercial activity. This commuting time does not add anything positive to the work or study of the individual; instead, this time represents a loss in time that might otherwise be spent in productive study or work or relaxation. Similarly, this commuting time provides little information, unless it be in the form of lessons about the worst (and more rarely, the best) aspects of human nature. Commuting is, for the most part, simply a waste of time and money and effort. Finally, both POV and PT transportation systems are land consuming and socially confining; there are "better" uses for the limited amount of land available on this planet and social change might come more readily--when desired--if societies were not so locked into their existant transportation facilities(redirecting an antenna is much more easily accomplished than moving a road or a fixed guideway).

To change this state of affairs, it is necessary to design a total communications system which will eliminate many of the

Questions & Observations

What does it cost to rent or maintain your office or school space?

How do you usually communicate with your superiors? Your subordinates?

Do you have a workroom or an office in your home already?
How much time do you already spend working at home on business or school affairs?

What would some of the economic consequences be for the business world if the majority of people stopped commuting to and from work/school/shopping most of the time?
What areas of industry and services whuld grow or be developed? Which areas would shrink or die off?

Do you agree with the claim that a transportation-oriented society is more resistant to change and transformation than a telecommunications oriented society would be? Why?

Resources & Projects

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McHale, J., The Changing Information Environment: A Selected Toography

Film: Understanding Stresses and Strains

Film: Majic Highway, U.S.A.

Project: Bring in some local resource people to speak on land use policy in your area. People from city and state planning commissions as well as people from transportation and housing divisions are usually good for this sort of thing.

Film: To a New World

needs for a person to transport himself or herself to educational, occupational or commercial settings in densely populated urban areas for the purposes of working, learning, and buying or selling goods and services. In most cases, the basic functions performed by the individual are not significantly changed; only the location at which or from which these functions are performed is altered.

The key lies in combining the present telecommunications capabilities into efficient systems which stress communication reliability. When one becomes confident that his or her educational, occupational or commercial function can be performed as efficiently at home or from a neighborhood communications plaza as it now is "in house" or "on location", he or she would be willing to realistically abandone the majority of commuting. A multi-channeled communications center--built first perhaps in neighborhood communications plazas and later in most homes--can provide each individual with the capability to interact with other persons or groups at distant locations on a routine basis. Then, when "special situations" arise, the individual can choose to travel to specific settings or locations for a change of pace in relaxation, education or work. It appears certain that not every situation can be taken care of via telecommunications--or, even if it could, that one would want to do everything remotely--but it is likely that, as individuals become accustomed to telecommunicating in the majority of their endeavors and undertakings, the "special situations" would decline significantly in number.

Essential to this system is the examination of the geographical locations of schools, offices and shops or services to consider where specific functions need to occur. With planned utilization

Questions & Observations

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Do you think the location of the majority or even part of the activities you daily undertake would be significantly altered if their locations were changed?

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Do you foresee any danger that such a system might insulate people from outside influences they normally would have to learn to deal with in order to be a truly "social" being?

Resources & Projects

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Film: What Holds People Together?

Miller, C.E., The New Einsteinian Culture and Communication

Communications Study Group (vol.3), The Study of Effectiveness and Impact of Future Systems of Person to Person Telecommunications

Project: Familiarize students with the use of publicaddress systems, video-tape-recoriers. Organize a a class presentation for video taping by the students; critique and commentary afterwards.

McLuhan, M., Understanding Media

of already existing telecommunications technology, the tasks of many offices, schools and stores could be decentralized to individual homes or neighborhood communications plazas. These communications centers could serve as an office next door, as a nearby supermarket or department store, as link to the steno pool, a lecture podium, a conference room, a think tank or a sales catalog. Clearly most of these functions could be effectively decentralized without decreasing (and possibly increasing) efficiency or man's inherent need for socializing. It would, in effect, make the majority of socializing a matter of choice rather than necessity by enabling one to separate out socializing from other forms of human interaction.

A desirable telecommunications system would need to incorporate the following concepts and technology: 1) an integration of single technologies into effective systems (videophones, two-way television), 2) elimination of intermediate processes, 3) cheaper electronics, 4) early acquisition of keyboard and information control skills, 5) optimization of the person/machine interface and the person/person interchange, 6) merging of communications storage and processing functions, and 7.) a systematic reappraisal of human values and needs.

There are obvious and numerous possible advantages to the efficient utilization of such a widespread telecommunications system. The time which is normally spent in travel would become discretionary time for other interests or more of the same interests one now pursues. The money now spent on maintaining the majority of POV and PT systems could be spent in other areas. There would be a reduction in the demand for fuel, since telecommunication requires less energy normally than transportation. Air and

Questions & Observations

Resources & Projects

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The increasing social isolation and alienation of man because he cannot actually "experience the world" but merely switches dials and modes in a passive way would hardly seem conducive to becoming a self-actualized person. What might happen to the majority of men if they lost the illusion that they were their own masters?

Do you agree that such functions might be improved by decentralizing them?

What changes in educational curricula and institutions might be required to facilitate the transition to this new emphasis upon telecommunication over transportation?

What new skills should become basic education in our schools?

Is number 7 something which is likely to happen in most societies without considerable turmoil?

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Project: Using closed-circuit TV, organize a class lecture/discussion beamed to a live audience in the next room or at another place. Try to test audience comprehension and compare those who saw the lecture on TV with those who were in the same room as the lecturer.

Film: The Ultimate Machine

Project: Design a neighborhood communications plaza.

Have someone knowledgeable in physics organize an experiment in electromagnetic radiation or, if a lab is available, have the students do the experiment themselves.

Project: Arrange visits to local telephone companies, TV and radio stations.

Film: Joshua in a Box

Theobald, R., Tegs 1994

Pierce, J., "Communications"

noise pollution would be substantially reduced and a large amount of land now used for transportation facilities might be used for other purposes. Individuals who still found it necessary to travel in their work--i.e., service and delivery personnel--would find less traffic in existing transportation systems. Much of the personal stress of being crowded together with too many people on roads, in offices and stores, etc. would be eliminated.

There may also be numerous possible disadvantages, however, to moving into such a telecommunications oriented society or world. A picture is said to be worth a thousand words and, in the same vein, physically proximate interaction may provide many types of information that may not readily lend themselves to telecommunication. Much human interaction has already been ritualized, stylized and dehumanized by machines and routines, but how much more would be lost if the major portion of bodily interaction were taken out of everyday life? Body language, facial expressions and the empathy/sympathy "senses" of another person's spiritual and emotional presense may not be adequately transmitable via elctronic means. Although an emphasis upon telecommunications in our social affairs may reduce some of the psychological stress received in traffic jams and overcrowded offices and stores, this same emphasis may also result in "undersocialization" due to increased isolation in remote areas away from human interactions on the social level. Also, as human interactions became more intellectualised and abstract due to the electronic nature of the communications, the emotional aspects of such interpersonal relations could become seriously defective: it is much easier to push a button which drops a bomb on some faceless entity below than it is to fight and kill a human being face to face; and to love someone and say so while holding on to them

Questions & Observations

Name some instances in which you think it would be better to travel someplace than to communicate with someone there.
Name some instances in which you would rather communicate than travel.

Could a society afford to maintain a good road system if only a small number of people used them regularly?

How might "selective socialization" reduce streif?

* Design an alternative use for land released from highways and parking lots.

Human being have a tendency to translate images into observable realities. However, where children are brought up on TV it has been observed that they seem to be compelled to validate images by confrontation with objective reality. The media stimulated child may accept images as being self-sufficient; the ads for something on TV may end up giving more enjoyment and satisfaction than the actual product or service itself. TV experiences may become complete in themselves. What effects whuld such experiences have upon the development of the individual personality? Upon the evolution of a TV society?

How might socialization be designed into communications systems which relied primarily upon electronics?

What are some of the "roles" you have observed people playing in their social interactions with other persons.

Resources & Projects

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Film: No. 00173

Film: Noise--Polluting the Environment
Film: Cities in Crisis--A Matter of Survival

Bensinger, C., Video Recording

Games: Starpower, Stratego, Monopoly, Woman and Man, a war game, etc. Playing highly competitive games can bring out a lot that remains latent in a personality under normal circumstances.

Fast, J., Body Language
Hall, E.T., The Silent Language

Dubos, R., So Human An Animal

Game: Circles

Project: Discuss Zimbard's "prison experiment" or one of the Stanley Milgram social experiments

Experiment: Try to communicate with someone using just your eyes. Try to be intimate or to intimidate someone with just a "look".

Carpenture, E., Oh, What a Blow That Phantom Gave Me!

Johnson, N., How to Talk Back to Your Television Set

is something quite different from telling one you love them or even dislike them over the phone or by letter. It is also possible that much of the psychological stress removed from society by taking people out of overcrowded areas and situations would simply be replaced by the stress arising from other forms of overstimulation (information overload) and breakdown (network interference, wrong numbers and waiting for open channels of telecommunication).

Thus, given that any system is possible, what system of communication should be developed? What balance between transportation and telecommunication should be achieved? And what specific functions should each aspect of the total communications system serve? These and other questions like them must be considered at the outset of designing an effective communications system. Such considerations as present technological capabilities, the state of systems integration, and economic feasibilities which are essential to real time implementation should not be the prime concerns of the communications specialist and planners. The design of the communications systems of the coming years should be based upon the needs of human beings for interaction and the possibilities for making life's tasks and functions efficient and enjoyable.

IV. Designing an Effective Communications System

It seems reasonable that man's basic physical and psychological welfare should be the prime consideration of the designers of our present and future communications networks. The citizens of tomorrow's societies and world deserve the right to interactive political systems, to increasingly efficient and safe transportation and emergency services, economic security, guaranteed health and medical programs, reasonably priced and available housing, environmental protection,

Questions and observations

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Given the required technology and keeping the present level of usage how many digits would your phone number have to have to allow for world-wide, direct-distance dailing --the answer is "15".

What are some of the basic human communication needs?

Resources & Projects

-13-

Ruesch, J. and Bateson, G Communication; The Social Matrix of Psychiatry

Meier, R.L., Organized Responses to Communication Stress in the Future Urban Environment

Project; Try to arrange for a demonstration of "holography". In any event, discuss the possibilities holography would provide if combined with a broad telecommunication network.

Film: Have I told you lately that I Love You?

Harms, L.S., Human Communication: The New Fundamentals

and equal oportunity for education, employment and relaxation. In short, people should be provided with a utility which gives them access to a total environment in as completely interactive a manner as possible. How can this need be best accomodated in a total transportation/telecommunications network is the systems design problem which confronts our planners and technological institutions today.

Such a communications system must allow for on-line, real-time attention to personal or private threats. It should provide for means of quickly apprehending criminals without endangering innocent citizens. As a part of a cable television system, security devices sould be installed in homes and buildings to electronically monitor the premises for fire and theft. Such a system could provide law enforcement agencies (both in their headquarters and in their mobile units) with instant access to computer data services to check on missing persons and stolen goods. Computer controlled traffic systems could keep traffic flowing freely and, when necessary, create "open roads" free of traffic for emergency vehicles. A complete system of integrated telephone, radio, TV and computers could literally monitor the pulse of a city and keep it healthy.

Educational systems could be facilitated by future telecommunication systems. Each citizen could become a student to the total environment that surrounded him or her; the world would literaly become his or her classroom. With educational TV, cable TV, radio, videotape and audiotape recorders, and remote computer terminals all integrated in the home, a student could call upon a limitless source of information and insight to interact with. School settings could take the form of homes, plazas, factories,

Questions & Observations	Resources & Projects
-15-	-15-
Would all the peoples of the earth want these sort of rights or privileges?	UN "Universal Declaration of Human Rights"
	Film: Focus on Interpol
	Film: What is a Computer?
What type of system would provide for human safety without depriving man of his right to free expression?	
What safeguards must be kept to maintain human privacy?	Orwell, G., 1984 Huxley, J., Brave New World
What percautions must be taken to guard man from man without isolating him from everyone?	Martin, J., Telecommunications and the Computer
	Meadow, C., Man-Machine Communication
	Tate, C., Cable Television in the Cities
What are some of the ways in which such complex and wide-ranging communications systems can be abused?	Film: The Communications Explosion
	Film: The Information Machine
	Film: A Computer Glossary
	Busignies, H., "Communications Channels"
	Hellman, Hal, Communication in the World of the Future
Should education be an inherent byproduct of a well-designed communications system?	Film: Class of '01--College of Tomorrow
	Film: Schools for Today and Tomorrow
* Set up a debate.	Film: What is Education--An Oxford Dialogue
	Film: Child of the Future
To what extent do you think that the "schools without walls" are already fulfilling a need in society that would be much like the needs of a electronics-oriented educational structure of the future; and could these open classrooms be easily transformed?	Film: Teaching the One and the Many

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farms, oceans and countrysides, all interlinked through electronic media and human facilitators. No longer need education take place in small lecture halls and inadequate libraries. Lectures andlectures would not necessarily disappear or become obsolete, but the student would no longer be tied to the one-to-many information flow situation of the past and present. Education might become less passive and more active from the side of the learner. Remote computer terminals might give a student access to statewide, nationwide or even worldwide library facilities. Such access could provide all the specialized information each and every person wanted in almost every field. Instead of thousands of scientific and literary "journal" being printed every month, the contents of each issue might be placed by the editors directly into a computer storage facility where anyone interested in that area or idea could call up and ask for a printout of that journal in its entirity or only part of its contents.

Such a complete communications system might provide every citizen with day-to-day news reports as well as with entertainment. Home computer terminals might supply the news on demand on TV screens with hardcopy printouts upon request. Individual databanks could provide the citizen with "personal space" to be used for keeping records, paying bills, preparing incometax forms, and writing recurring letters. Telecommunications devices could link many aspects of homes and offices to telephone and telemetry systems; such connections could be used to turn of the oven, read the power meter or turn on the lights. Increased channel capacity of cable TV systems will offer more programs for individuals viewing tastes. Separate programs with continuous news, sports, movies, public events, goods for sale, etc. could all be continuously available.

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How much of your education is "active" and how much of it is "passive" in your opinion?

Do you think the manner in which information is "owned" by the people who produce it is a good way to encourage free flow of information? Should the copyright laws be revised to accomodate a new telecommunication-oriented society?

What effect does the organization of a society's communications system have upon its social structure? To what extent should information be available in global data banks?

* Set up hypothesis—Formal debate

To what extent do you think individual citizens should participate in the various levels of governmental decision making?

How much do you think the media creates the images of political candidates?

* Do an historical case study of a candidate whose political image was created by media.

Can electronic communication replace the human needs to touch, smell and even taste that which they are interacting with?

Would large scale advertising still be necessary in a sophisticated telecommunications society? Do you think it is necessary now? Good?

Project: Review and evaluate some of the outstanding communications studies programs such as the Philadelphia Parkway Program.

Marien, M., Alternative Futures for Learning

Kretzmer, E,, "Communications Terminals"

Project: Visit an airline ticketing office or some other computer serviced business to see how the computer is used to aid people in their work.

Film: Cities of the Future

Film: Megapolis--Cradle of the Future

Goldmark, P., "Communications and Community"

Bagdikian, B., The Information Machines

Film: Fahrenheit 451

Film: Media--Messaging the Mind

McGinnis, A., The Selling of the President, 1972

Maddox, B., Beyond Babel

Project: Ask stuents to compile documents of advertising techniques and analyze how and why they work to encourage people to buy.

Perhaps the most important aspect of almost all of these possible future communications systems is that the receiver and not the sender will be in control of the media. A proper communications system will be a "demand-pull" system rather than the present "supply-push" system that plagues so much of our recreation, education, and information systems. In such cases, the individual may choose to receive nothing at all, to be left alone; and when he or she is ready, it will be their demands as individuals which will determine what they call forth as entertainment, as education, as information. The outcome of this approach to reversing the control of the media from sender to receiver is that a totally interactive communiations system could be created which need not threaten the participants with an information overload. It could instead give the individual even more control of his time and communications activities.

The economic and political impact of such a system would be considerable. A more informed public with the ability to vote directly on those issues which concerned them would lead to a more democratic process in the political arena. The individual vote would become more important than ever. Likewise, a more refined data system would provide instant credit and cash controls, all without the need to carry any cash at all with one. Instant bank balances, bill payments, and business transactions, to name but a few, could be transacted through the home or store digital phone or "credit register". Automatic purchasing and bill-paying would be possible simply by dialing the bank computer and recording the proper transaction (much as the present "weekend, money machines" or banking automats now do) from anywhere one was located. An electronic debit would be recorded to the purchaser's account and

What is the role of the advertising industry? What is the role of the manipulator and the manipulated in advertising with respect to social responsibility?

* Make a personal survey of demand pull, supply push examples in your own life situation.

Do individual in a complex society have a right to be left alone?

Do you think a sophisticated telecommunications network would result in people not getting enough physical and mental exercise from their work and life style?

Should the design of future communications systems be left up to experts? Do you think the average citizen really knows what he or she wants as a communications system?

Do you think a good communications system will automatically result in a well-informed public?

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Frederiksen, H., Community Access Video

Jones, M.V., How Interactive Television Will Affect the Way We Live: An Initial Assesment

National Cable Television Assn., Information Package (free of charge to any interested party)

Film: Television and Politics

Packard, V., The Hidden Persuaders

Theobald, R., Teg's 1994

Film: The Year 1999 AD

Johnson, N., How to Talk Back to Your Television Set

Film: Media--Massaging the Mind

White, T., The Making of the President 1966/1972

an electronic credit to the seller's account. All the necessary bookkeeping and end-of-the-month records would be handeled by the computers. Goods would be delivered by professional delivery services and cars could be made much smaller, since their capacity to act as trucks for shopping sprees would diminish.

V. Areas of Concern: Control and Evaluation of Communication

By way of summary, a discussion of the control and evaluation of communications and informations systems is in order. First off is the "physical control" of information and communications systems. The whole process of reporting, categorizing, filing, retrieving, correcting and advertising information into various areas of the many systems must be worked out. This is not so much a technological problem as it is a conceptual problem. The costs of using both transportation and telecommunications systems must be worked out on a basis that is fair and equal to all users of such a system. The problem of "right to know" and the "need to know" with respect to information will always remain a sticky one. Classified information will always be a perogative of governments, businesses and individuals unless the tune of human interaction changes drastically in the future. A tremendous amount of money is spent classifying information and attempting to discover information (espionage) every year. This is mutually destructive money wasted on preventing the free flow of information; it is money that could much better be spent on the creation of new information. The belief that experiences and ideas and information belong to someone is perhaps the foremost cause of this problem. A new communications ethic should follow the true sense of the word and lead to a total sharing with no advantage to the one who knows something no one else is able to find out.

Questions & Observations

* Make a personal survey of how propaganda (advertising) has positively/negatively affected recent decisions.

Very little work is currently being done on assessing the impact of a barrage of technological innovations upon human capacities to comprehend and assess their world.

How would you go about doing a technology assesment of some of the telecommunications methods and systems suggested in this discussion?

How do we resolve conflicts between external attitudes and internal compulsions?

What methods can you suggest for maintaining control over the quality and quantity of transmission content in telecommunications?

What methods do you personally use to sort out reliable information from publicity and propaganda in your daily life?

What sorts of things do you think any citizen of a society has a right to know about his government and all its parts? What sorts of things do you think should be kept secret from a country's own people?

Resources & Projects

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Film: Data Processing

Film: The Computer Revolution

Toffler, A., Future Shock
McLuhan, M., Understanding Media
Berger, P., The Social Construction of Reality
Royce, J., Encapsulated Man
May, Rollo, Man's Search for Himself
Marcuse, H., One Dimensional Man
Chardin, T., Building the Earth

Film: Consumer Power

Price, M. & Wicklein, J., A Guide for Citizen Action

Harms, L.S., Intercultural Communication

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Film: Privace--Can You Buy It?

Marchetti, V., & Marks, J., The CIA and the Cult of Intelligence

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There are also problems with planning the use and control of communications hardware in the future. Should such equipment be publically owned or privately owned; should people buy it or lease it? The cost of both the equipment itself and the training needed to utilize it effectively is liable to be high. In that information is very much the currency of power in the world, a discrimination in the availability of equipment and skills of communication could become the worst form of social abuse.

The control of quality of both information and equipment is liable to present another serious problem, one that we already have in today's world and one that will only get worse unless some means is contrived to deal with it. How does one determine the reliability of information? There will never be a sigle way things should be, or a single viewpoint which is totally objective, or a single right or correct answer; but some people are more "expert" than others, more qualified to speak on some subject than others. Some information is more reliable than other, and some people are more responsible in the sense of "social accountability" than others. How does one control the use of information and evaluate its sources and relevancy? Will the communications system of the future allow the intentional abuse of information and communication systems through advertising and propaganda which are clearly false or intentionally misleading? If so, then people will be very reluctant to transfer an increasing amount of their daily activity to telecommunications systems which rely upon "faceless" people and machines to direct and control the world's data and communications systems.

In this same vein, the quality of current communications hardware often discourages people from turning over more of their life's activities to such a system. The massive breakdowns of

Questions & Observations

Resources & Projects

Does anyone "own" the airwaves?

What are some of the problems you foresee that might arise with respect to national sovereignty and cultural sensitivity if international satellinte broadcasting ever begins?

Do you think that there is such a thing as complete objectivity in reporting something? Do you think you could be completely objective in your perception, observation or reporting of something?

What do you think of the current quality of most TV shows?

What is your opinion on using TV to bring violence, sex, crime, and war into homes? How about coverage of trials and political debates? How about situation comedy and soap operas? How about theater, musical performances and sports events?

Discuss any times you have had a "run-in" with a machine or a computer which didn't work right. Who won? How did you resolve it?

Film: A News Story

Brown, L.R., A World Without Borders

Wiener, N., The Human Use of Human Beings

Wiener, N., Cybernetics

Project: Choose a particular recent event and copare the coverage given to that event in several newsmagazines, newspapers and on various TV and radio programs. Discuss the "biases" that are detectable in the reporting of this event.

Cirino, R., Power to Persuade

Rissoner, F., Buch, D., Mass Media and the Popular Arts

Film: Visual Perception

Film: Eye of the Beholder

Film: Perception and Communication

New York's telephone networks and the systematic mistakes of computer billing and customer records systems, which take months if not years to correct in some cases, are only several instances that do not spell hope for a future given over too greatly to a complex communications network.

These problems might and probably can be worked out on a technological level. Still, the fundamental tasks of judging the quantity, quality and integrity of information and communication will ultimately fall into the lap of the individual. It is he or she who chooses to be a part of an interpersonal interaction via some transportation or telecommunication system, and it will always be he or she who must exercise selectivity toward the quantity of information to prevent an overload of trivia, who must exercise a constant quality control with respect to the status of the sources and situations of information, and who must constantly maintain the sort of integrity in attitude and perspective that makes it possible to judge whether any given data or communication obscures or clarifies an issue.

The computer scientist is perhaps more aware than anyone else of what such a communications network can be. With the term "GIGO" (Garbage In, Garbage Out), he recognizes that such a net will always be only as efficient and reliable as its human link. Our tools of communication may improve and open up whole new horizons of possibility to us, but if we continue to use them in many of the same garbage ways we do now, these new tools will only increase the speed and intensity of civilization's demise upon this planet. All is filled with problem and possibility and, as always, it is man who must decide amoung his alternative futures.

Questions & Observations

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Resources & Projects

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Film: Conformity

Baer, W., A Handbook for Decision Making

Film: Rhinoceros

Film: Computers and Human Behavior

Clark, A.C., Profiles of the Future

Film: Some Call it Software

Film: The Information Machine

All of the principal system alternatives for passenger transportation for which data are readily available are compared in this chart in terms of their net propulsion efficiency, the number of passenger-miles moved per gallon of fuel. Note that the number of passengers on which the efficiency is calculated is not necessarily a maximum capacity but is instead an average figure for present experience. Efficiency rises dramatically as more passengers are accommodated: with three occupants a Volkswagen "beetle" comes out with a net propulsion efficiency of 100.

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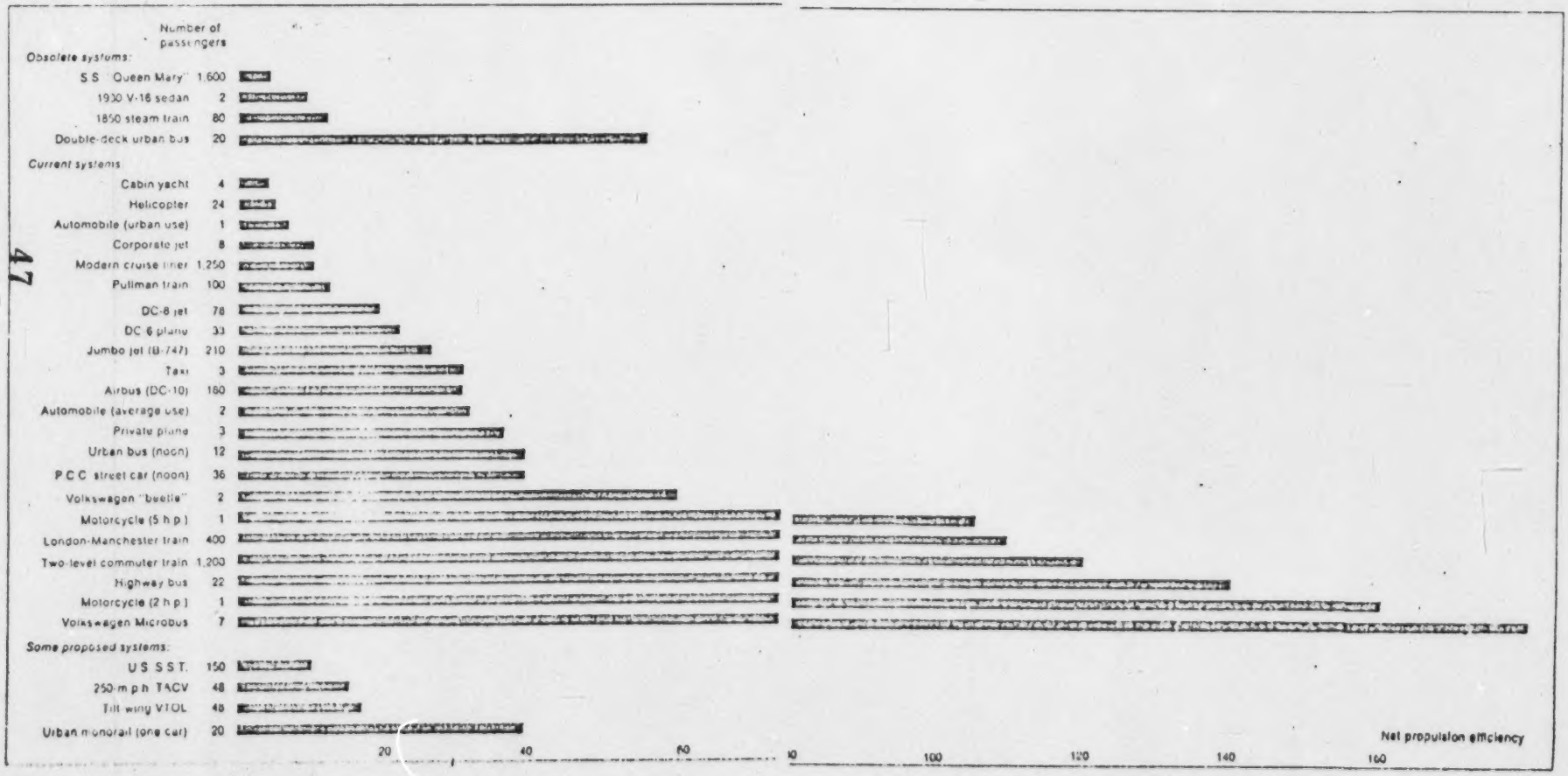

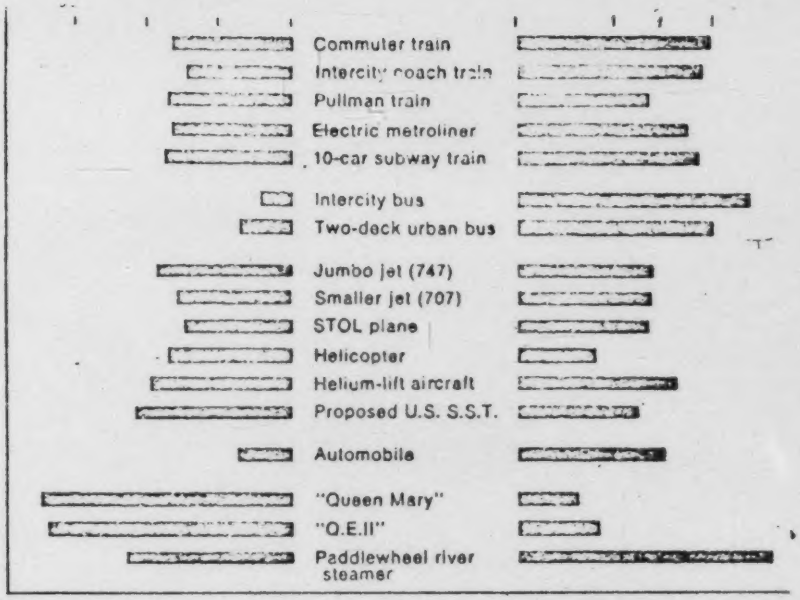

In passenger transit, the high performers in terms of net passenger miles moved per gallon of fuel are buses and commuter trains; the more exotic, faster means of transport are lower in efficiency, and so are such hard-to-die luxuries as superliners and Pullman (overnight) trains. A trend to the mo efficient forms of passenger transport, writes the author, would considerably i crease the U.S. national propulsion efficiency. Note that the horizontal scales are logarithmic.

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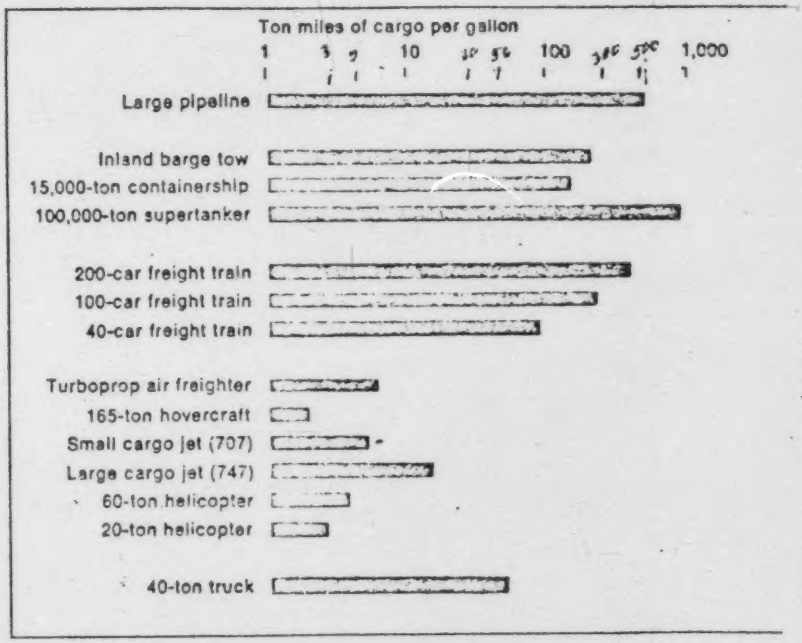
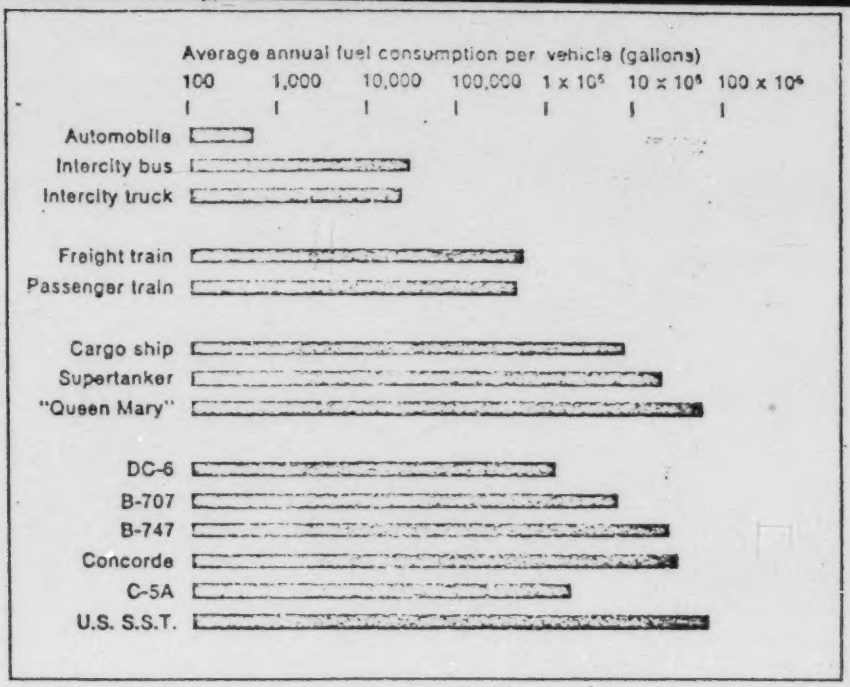


In freight service pipelines, inland waterways, and railroads do not use significant amounts of energy in relation to goods moved. In fact, writes the author, in 1965 these three forms of transport used only about 5.5 billion gal. of petroleum (7 per cent of U.S. transport energy) to provi 1,250 billion cargo-ton-miles of service and 60 per cent of all gross ton-miles moved in the U.S. Note that the horizon scale is logarithmic.



If and when absolute fuel consumption becomes a primary issue in transportation planning, engineers will discover how extravagant are today's more exotic (and faster) forms of transit. The figures given above are based on the current average service required of each vehicle, ranging from less than one hour per day for the automobile to 20 hours per day for a supertanker. Though freight cars move an average of only about one hour a day, locomotives (the figure above) are estimated at between 5 and 6 hours' travel per day. Note that the horizontal scale is logarithmic.

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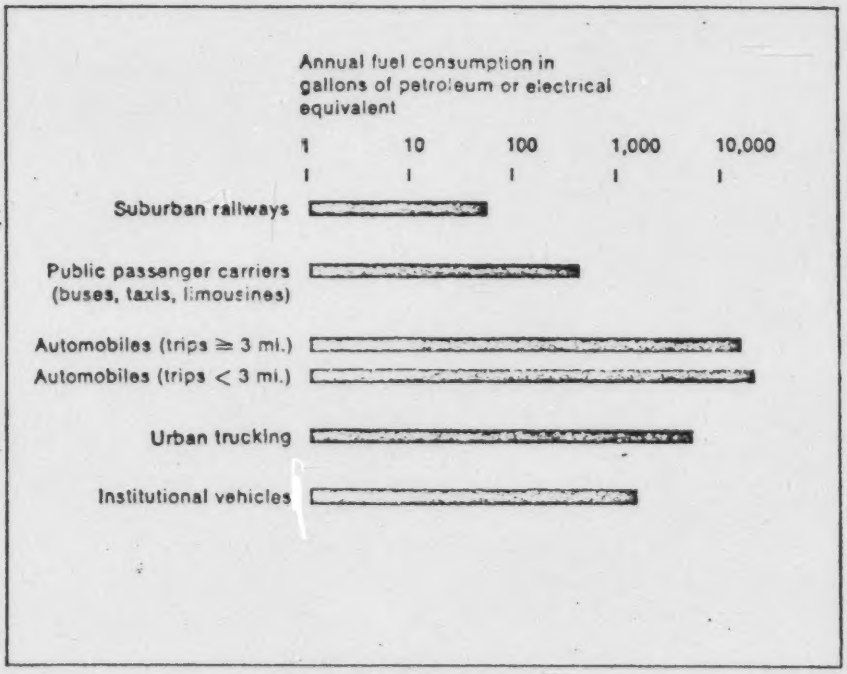


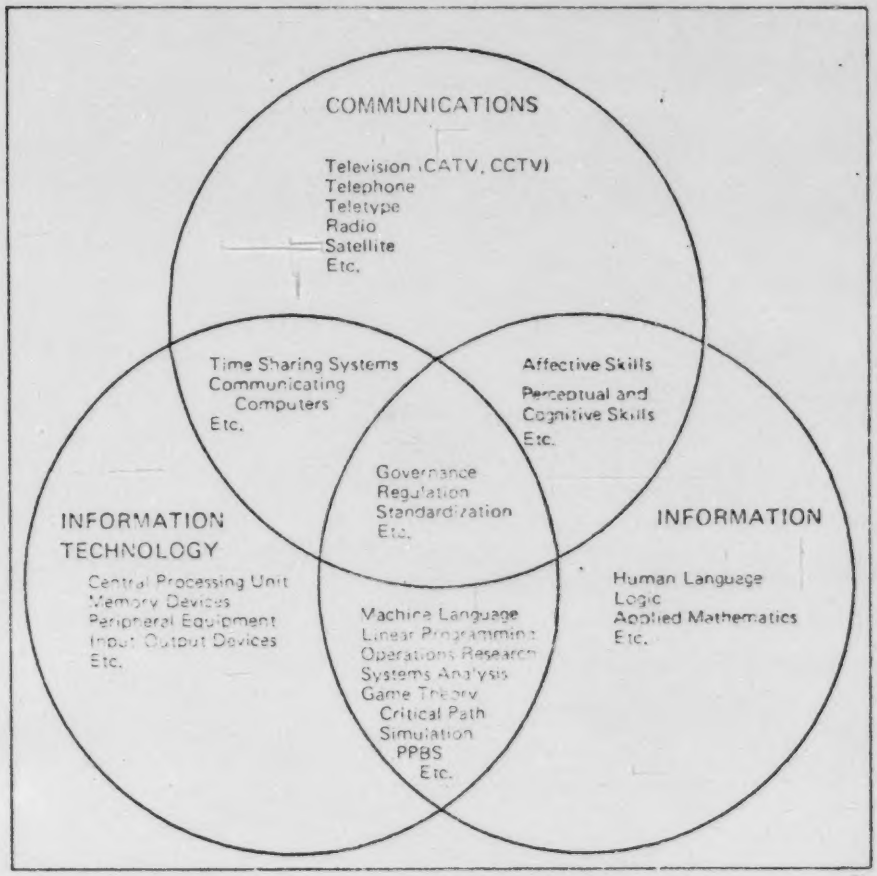
Automobiles have by far the greatest claim on energy resources used for urban transportation. A major reduction in energy expended—and presumably in urban pollution problems—could be achieved if automobiles could be eliminated for trips of three miles and less.

While an automobile accomplishes some 30 to 40 passenger-miles of transport per gallon of fuel used, a bicyclist obtains about 1,000 passenger-miles for the same energy input, about 130,000 B.t.u. or 34,000 calories (kcal).

Interaction of Information and Communication Technologies

The crucial developmental point in this swift growth and diffusion of these systems has been the convergent interaction of information technology and communications. We may schematize some aspects of this interrelationship in the diagram below. (5)

Although the following schematic gives only an approximate mapping of the various domains and intersections of information, communications, and information technologies, it may serve to mark the significant shift which occurs when these areas become intertwined.



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Concern is with the effects of new developments in information technology ... (But) "information technology can have many different meanings. Here it means simply and specifically, the electronic reproduction, processing and transmission of information and its developments including the use of microwave and satellite broadcasting, the greatly expanded use in the offing of CATV and more powerful EDP capabilities. We presuppose a vastly increased capacity for the rapid, low cost electronic transmission of messages received as simply image or information from anywhere to anywhere, associated with the capability for speedy rapid storage, reproduction, and computer programmed processing of messages." (Sola)

In combination with other technical developments, such as digitized transmission of graphic and audio inputs, image technology, holography, etc., this portends a further quantum jump in the uses and impacts of these vastly amplified capabilities.

It is precisely this convergence and interlinkage which creates the radically new information environment into which we are now emerging.

It should be noted also that we are dealing with a phenomenon, not unprecedented in sociotechnical innovation, in which the characteristics of any one set of wholly technical aspects considered in isolation may not enable us to predict the overall implications and potential consequences of their interactive combination. The behavior of the whole is more than the sum of its parts.

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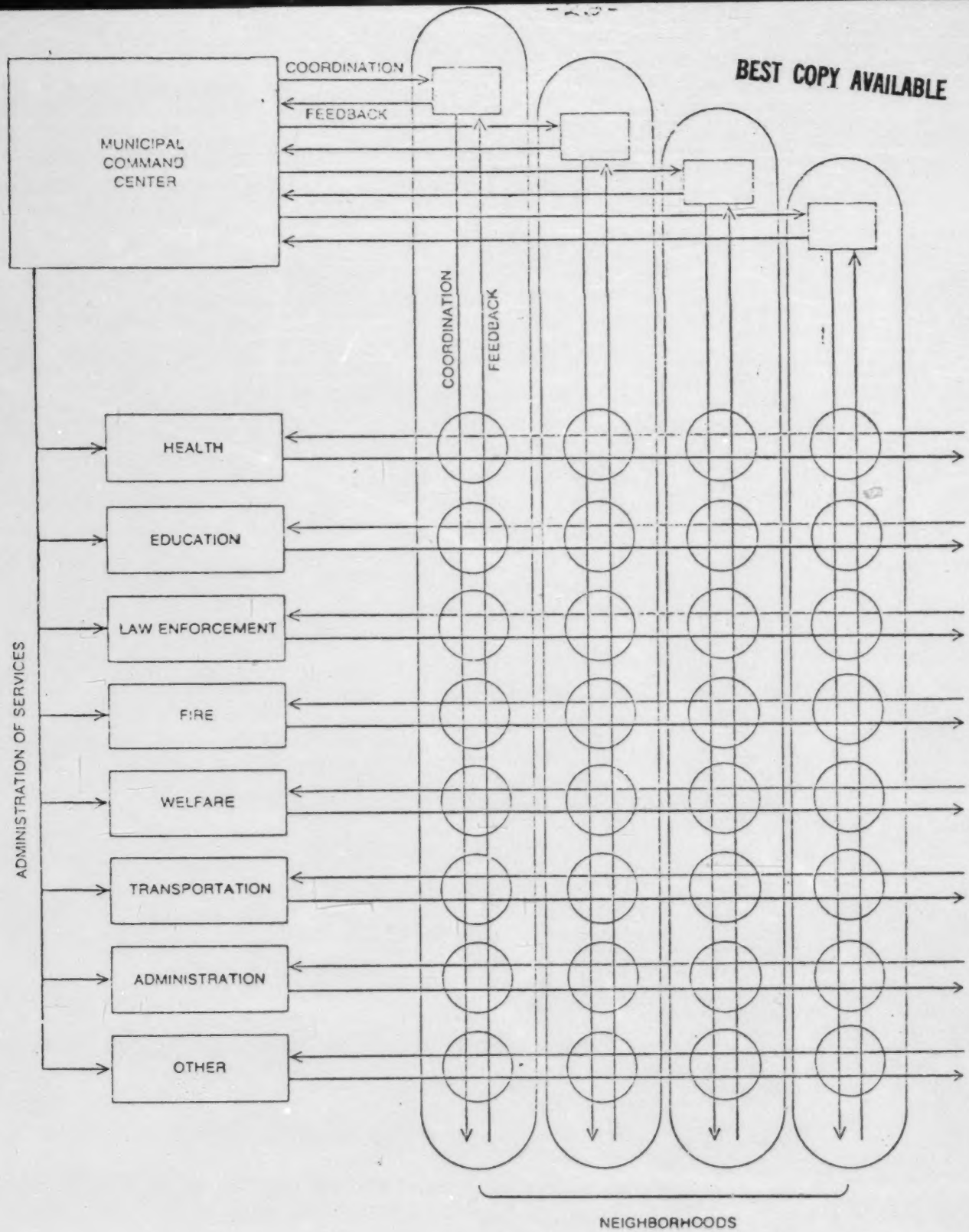

FUTURE NETWORK of communication in a city is depicted schematically. The emphasis of the system is on giving city officials more direct means of communication with residents and on giving residents better ways of finding out about municipal services and conditions and of reaching public officials. Each neighborhood (*light color*) would have a community information center (*black boxes*) that would include a computer programmed to provide information about services and conditions. Neighborhoods and regions within a neighborhood (*gray circles*) would be able to voice needs (*color*) to municipal departments and obtain services (*black*).

Source: Peter C. Goldmark

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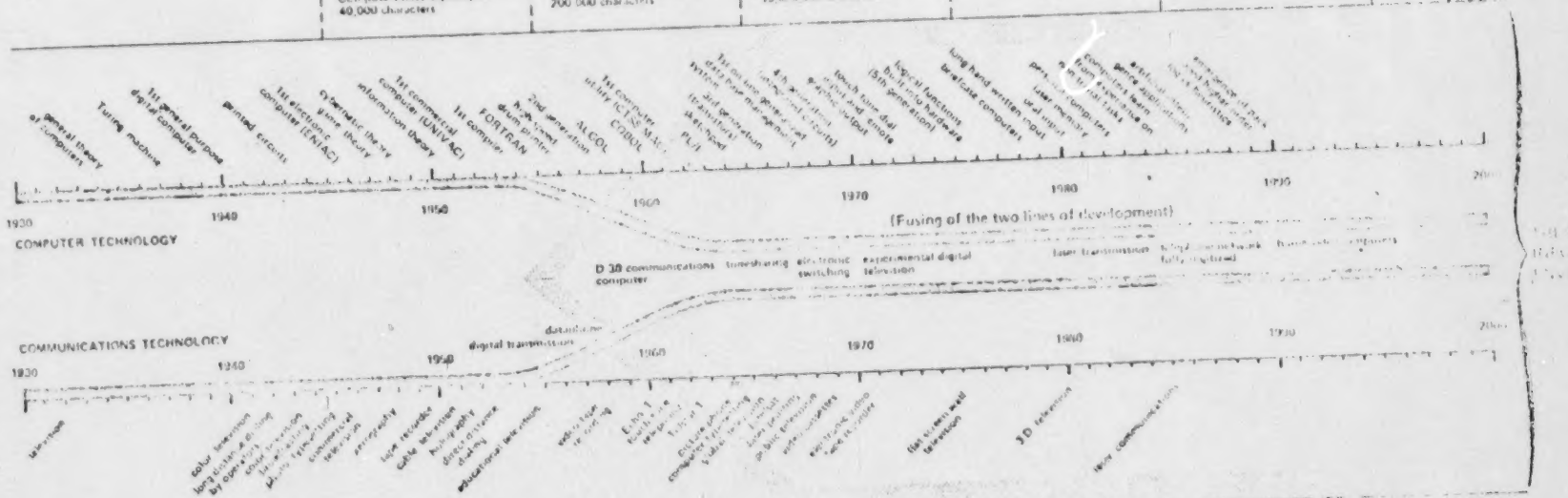
Simplified Chart of Developments, Uses, and Impacts of Information Technology

COMPUTER COSTS	In 1945 a unit cost about $1 (kk) to do a million operations on a keyboard and took at least a month	In 1952 a unit cost about $ (kk) to do a million operations and took ten minutes	In 1965 a unit $ .2¢ to do a million operations and took a second	Computer currently handles operations for less than 6 cents in about 1/2 a second	Computers will do a million operations for 1.10 a cent in 1/10 a second	Between 1965 and 1972 computer cost to do same by a factor of 100
COMPUTER SPEED	In 1954 computers have a speed of 2000 operations per second	From 1955-1965 internal speeds have increased by a factor of 200 Computer speed is up to 150 000 operations per second	From 1965-1975 internal speeds have increased by a factor of 200 Computer speeds are up to 4,000,000 operations per second			
COMPUTER SIZE	Computers have capacity of 40,000 characters	From 1955-1965 the physical size of the central processing unit decreased by a factor of 10 Computer capacity is up to 200 000 characters	By 1975 fully integrated circuits began to reduce the size by a factor of about 100 Computer capacity is up to 15,000,000 characters			



MODALITIES					
ONE/ONE MODE OF COMMUNICATION	Modes of communication such as word of mouth, drums, smoke, relay runners and hand printed materials were the major means of communication till the invention of the printing press	Telephone and telegraph now provide individuals with access to a system which accomodates personal and almost instantaneous communication across distance with ease of access, wide availability and individual control over content	Telephone networks and equipment become increasingly versatile, dial telephone, direct distance dialing, picturephone Datasphone, tele-texts for remote servers extend this into other modalities	Computer applications and communications satellites provide highly sophisticated authority and internationally linked one to one communication networks possibilities.	Electronic mail and computer conferencing systems are already fully operational and pictorial one to one communication with a degree of flexibility and personal control over content
ONE/MANY MODE OF COMMUNICATION	The introduction of the movable type printing press enhanced the possibilities of communication in a one to many print mode	Mechanical improvements in techniques of printing resulted in proliferation of printed materials e.g. books, newspapers, periodicals Aural one to many communication was limited by range of unaided voice until the invention of the radio	Radio and television provide high capacity information systems to the home and give a variety of educational, entertainment and other information. Range of choices of programs but little direct control over content	Print technology further augmented by the introduction of computer and laser technology e.g. computer typesetting and laser printing Copying machines extend print technology into highly selective, personalized mode	
MANY/MANY MODE OF COMMUNICATION			Switched one to many and one to one modes convert these to potential many to many modes. News dissemination through wire services and distribution through newspapers, radio or television are examples.	Also note the recent growth of 'under ground' presses, news services and papers, journals, cinema, radio and video cassettes.	
MANY/ONE MODE OF COMMUNICATION			Increased efficiency and specialization of media will make possible an expansion of existing modes and variety to new situations. Community antenna television, video cassettes and electronic video tape recorders are currently systems potentially capable of many new services.	Examples are more individually oriented information and educational services specialized news services remote mail facsimile services, etc.	Potential but currently experimental and very limited services with a view to be used for polling, information and other interactive response activities

INFORMATION INDUSTRY
AND ITS RELATED
INDUSTRIES

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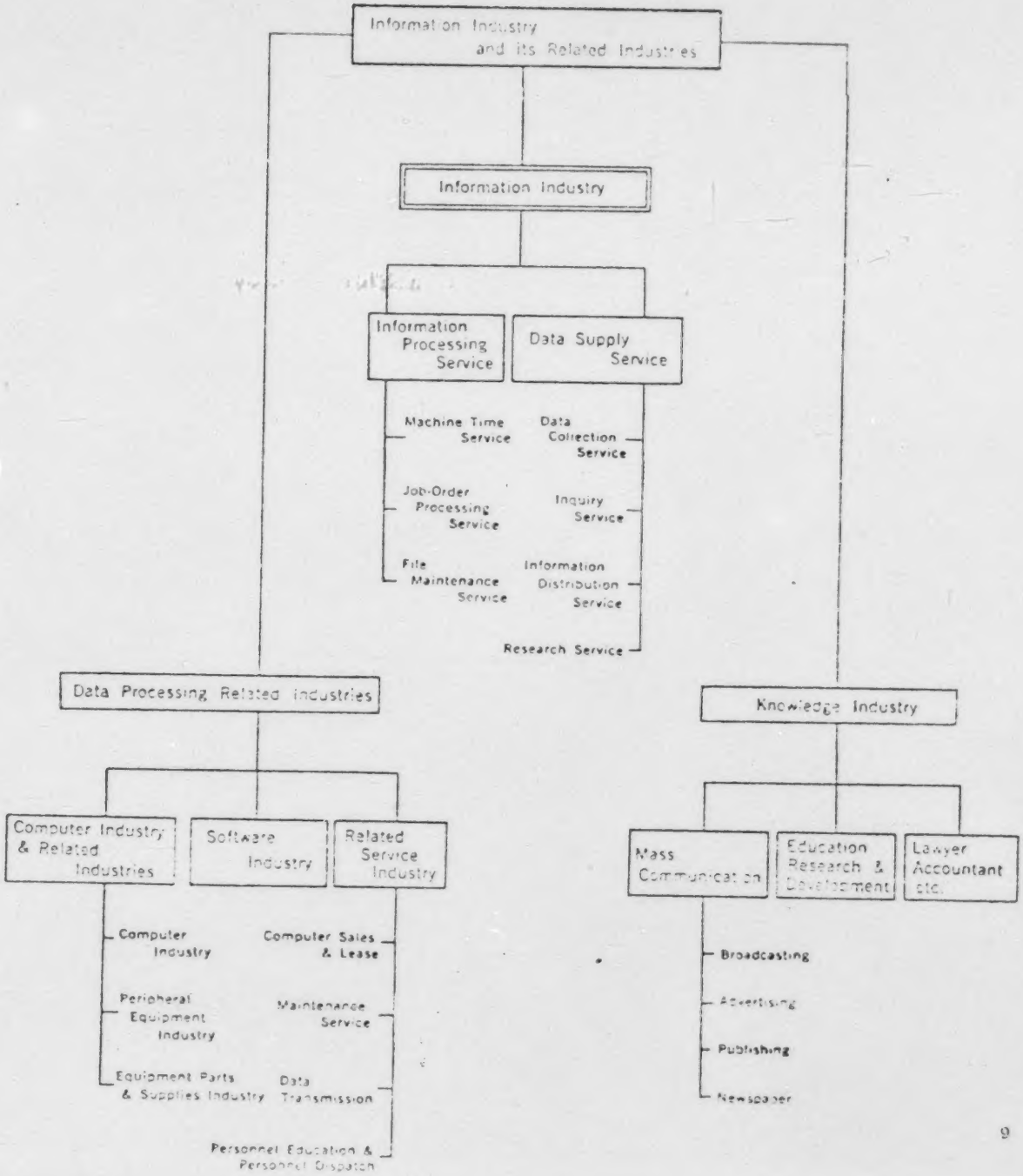

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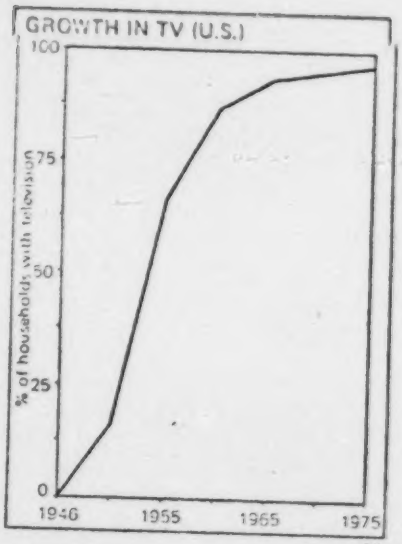
Television gained dominance when, for other reasons, the American family was being transformed. The influence of parents over children diminished as jobs and civic-social activities increasingly took adults farther away from home and neighborhood ... Into the void stepped the new electronic teacher-playmate-babysitter-parent, designed primarily not to educate the mind, develop the personality, or enrich the national culture but to sell the maximum amount of merchandise at minimum cost. In the process it effectively implanted a new way to communicate.7



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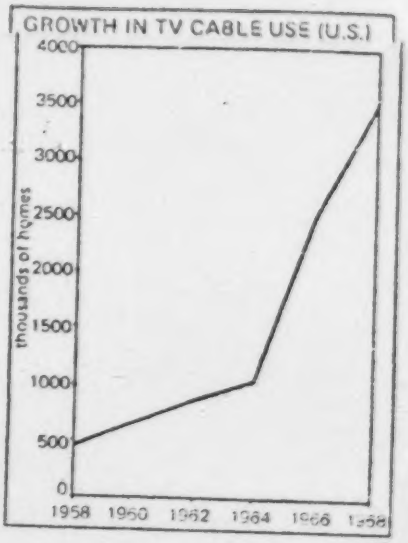

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The most highly paid writers, actors, musicians, and producers in the world are not those that create education for the young, or drama for adults, or political programs for the voters. They are the men and women who create television commercials. This is a serious distortion of the uses of national talent for a society struggling with dangerous social tensions. The attention of the American population is one of the most valuable commodities in history. The United States produces more than $785 billion worth of goods and services each year. Almost two-thirds of that, $492 billion, is in consumer spending. To capture a larger share of that almost half-trillion-dollar annual prize, various corporations spend $17 billion a year in advertising.8

SOCIAL CLASS LEVEL AND TELEVISION VIEWING

	minutes watching TV per weeknight	percentage who 'never watch'
Upper	16	33
Upper-middle	31	30
Lower-middle	63	18
Upper-lower	100	9
Lower-lower	180	6

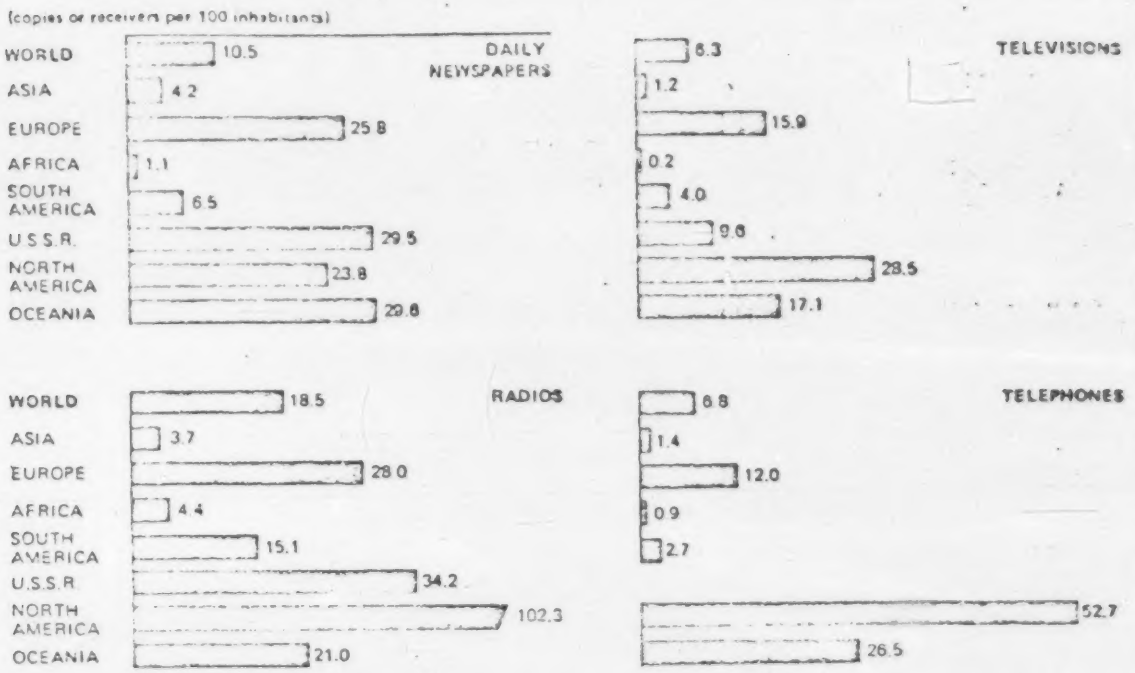
16

ANNUAL COSTS FOR HOUSEHOLD COMMUNICATIONS

Telephone	$225
Newspapers	$120
Postal service	$116
Television	$102
Periodicals	$44
Books	$42
Radio	$26
Phonograph records and tapes	$13

17

Access to Knowledge Distribution in "Have" and "Have Not" Nations



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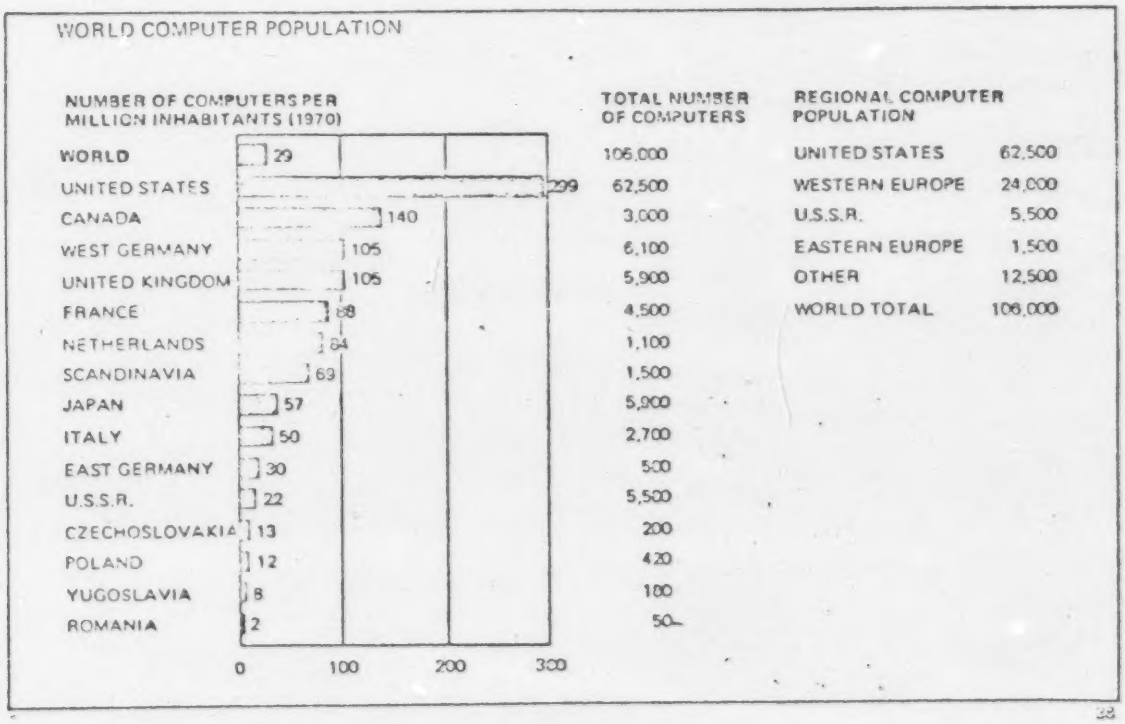
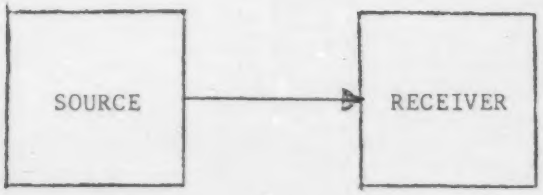
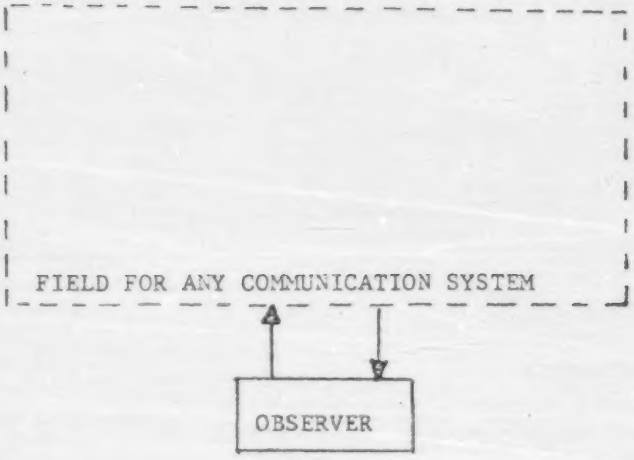
Communications Capacity as an Indicator of National Wealth

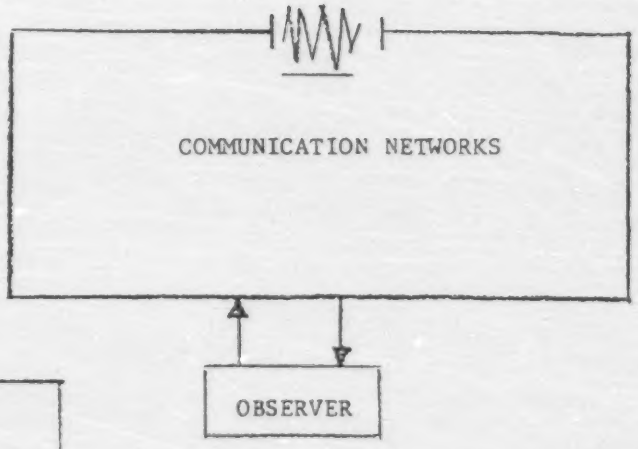


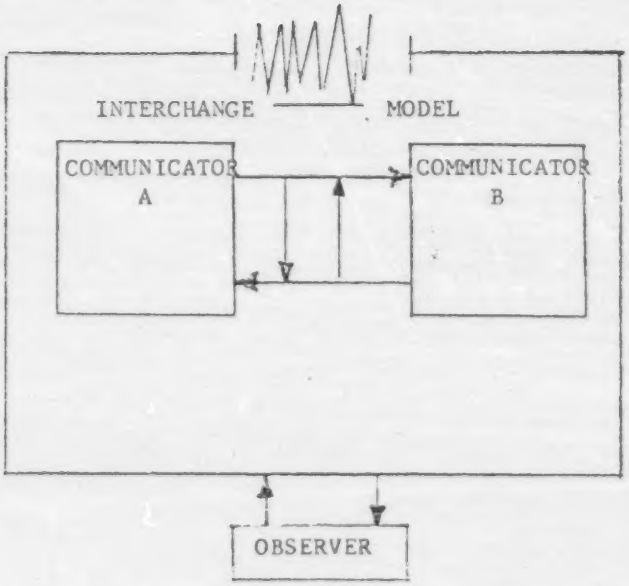
COMMUNICATION MODELS *

TRANSMISSION MODEL









*Adapted from Harms, L.S. , Human Communication, the New Fundamentals, New York : Harper and Row, 1974.

Glossary

aerial – an antenna usually made with wires for collecting or transmitting radio waves.

analogue transmission – the sending of signals in the form of an electrical current which physically simulates the signal.

antenna – a device for receiving or transmitting radio or radar waves.

band – a range of radio frequencies allocated to a specific use.

bandwidth – the width of the band of frequencies occupied by a particular communications channel.

bit – the smallest measurable unit of information in a communications channel.

broadband – the term used to describe a communications channel that occupies a wide band of frequencies. Broadband channels are used for sending a large amount of information in a short time.

broadcast – the sending out of waves of radio communication to be received by the public at large.

cable television – a means of transmitting television through a wire or cable rather than through the air.

channel – a band of frequencies within which a radio or television station operates.

circuit – an electrical or electronic path; a term commonly used to describe the bandwidth taken up by a telephone conversation (roughly 4,000 cycles a second). Thus a television circuit can be described as requiring the equivalent of 600 to 1,200 telephone circuits.

cycle – one complete to-and-fro motion of an electrical current or an electromagnetic wave.

digital transmission – the sending of signals in the form of units of information, usually the code used by computers.

electromagnetic radiation – a phenomenon including radio waves, radar waves, infra-red radiation, light, ultra-violet light, and also X-rays.

electromagnetic spectrum – the range of frequencies at which electromagnetic radiation can be propagated.

exchange – the switching center in which teleprinters or telephones can be connected to any other within the system.

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frequency – the number of times a second an alternating current makes a complete cycle. (See Hertz.)

frequency allocation – the assignment of frequencies for use by the various radio services and classes of stations recognized by the ITU.

gigaHertz – unit of frequency equal to one billion cycles a second. (See Hertz.)

Hertz – a unit of frequency equal to one cycle a second. It takes its name from Heinrich Herz (1857–94), a German physicist and early experimenter with radio waves, and is rapidly replacing the term 'cycles per second' as a way of describing the frequency of radio waves.

high frequency (HF) – frequencies within the range of 3,000 to 30,000 kilocycles per second (not high by today's standards).

integrated circuit – a chip of semi-conductor material which combines a number of miniature transistors to make one electrical circuit.

laser – acronym for Light Amplification by Stimulated Emission of Radiation. A laser produces a powerful, highly directional, monochromatic, coherent beam of light which may someday make light waves usable for communications.

microwaves – electromagnetic radiation with wave lengths ranging from very short radio waves almost to the infra-red region (from thirty centimeters to one millimeter in length).

millimeter waves – those above the microwaves on the electromagnetic spectrum and so short that to be useful for communications they must usually be sent through pipes called waveguides.

optical communications – possible communications method of the future in which highly concentrated beams of light are made to carry message codes.

pay TV – a television service in which the viewer pays to see special programs or channels.

private line service – a service in which two or more designated points enjoy the exclusive use of communications circuits for specified periods of time.

pulse code modulation (PCM) – a way of sending signals by intermittent pulses.

radar – an acronym for Radio Detection and Ranging; a term used to describe any systems using microwaves to detect and identify moving objects.

radio – the use of electromagnetic radio to communicate electrical signals without wires.

radio spectrum – the part of the electromagnetic spectrum used for radio communication.

radio telegraphy – the sending of coded messages over distance without wires.

radio telephony – the use of radio waves for carrying telephone conversations.

relay (broadcasting) – to re-transmit a signal received at a given point. Cable television began as a method of relaying television signals.

(electrical) – a device by which the electrical current flowing in one circuit can open or close a second circuit and thus control the switching on and off of a current in the second circuit.

satellite (communications) – an artificial earth satellite used for relaying radio and television signals around the curved surface of the earth.

semi-conductor – an electrical conducting material whose resistance, unlike that of metals, decreases with rising temperature and the presence of impurities – the basis of the transistor.

Strowger – the step-by-step telephone switch invented by an American undertaker, Almon Strowger, in 1889, which is still the basis of most of the world's telephone exchanges.

switching – the central process of telephone and telex systems: the acceptance of calls and sending them along a route to their designated destination.

synchronous orbit (or stationary orbit) – the orbit of an artificial earth satellite which takes twenty-four hours to circle the earth, traveling parallel to the equator, and which appears to hover over a fixed spot. The altitude corresponding to such an orbit is about 22,300 miles. It is the most useful orbit for communications satellites.

telecommunications – the transmission, emission or reception or signs, signals, writing, images and sounds or intelligence of any nature by wire, radio, visual or other electromagnetic systems.

telex – an automatic teletypewriter exchange service. Various national systems are linked by the international telex system through which typed messages can be sent to any other machine in the system by dialing the appropriate number.

transistor – a small device made of semi-conductor material used to amplify electrical current in a similar manner to that of vacuum tubes or valves. Its advantages are lightness, cheapness and durability.

ultra high frequency (UHF) – the band of frequencies extending from 300 to 3,000 million cycles a second, likely to provide opportunities for further expansion of television broadcasting.

valve (or vacuum tube) – a device capable of amplification of electrical current.

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very high frequency (VHF) – the band of frequencies extending from 30 to 300 million cycles a second. The band in which most American and British television has been broadcast.

waveguide – a hollow metal conductor through which microwaves may be propagated.

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Films Available from the Department of Education, Audiovisual Services Section

Symbols and abbreviations used:
- P - Primary grade students (kindergarten - grade 3)
- E - Elementary school students (grades 4 - 6)
- J - Intermediate of junior high school students (grades 7 - 9)
- H - Senior high school students (grades 10 - 12)
- C - College students
- A - Adult study groups or other organizations
- T - Teacher groups, workshops,and seminars

AT HOME, 21ST CENTURY: 25min HA #4095
Explores some innovations builders of the twenty-first century may employ to meet the challenges of urban living. Shows trends in architecture, city planning and modern technology as applied to home devices. 1967

AUDIO-TUTORIAL SYSTEM, THE - AN INDEPENDENT STUDY APPROACH: 25min J-C A
Illustrates the teaching methods of S. N. Postlethewait, developed for an introductory course in botany at Purdue Univ. 1968

CHILD OF THE FUTURE: 58 min P T #3494
Examines ways to technology is being used in classroom. Narrated by Marshall McLuhan. 1965

CITIES IN CRISIS: A MATTER OF SURVIVAL: 18 min J #5789
Contrasts ugliness of technological growth with nature's beauty. 1970

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COMPUTER REVOLUTION, THE: 15min P T #0558
Presents an introduction to the new world of computers, emphasizing their present uses and their potential for the future. 1968

CONFORMITY: 8min H C A #5188
An animated film that shows that people tend to live in patterns. Satirizes the loss of identity which man experiences in his daily routine. Without narration. 1970

DATA PROCESSING: INTRODUCTORY PRINCIPLES: 15min J H #5686
Introduces the punched data card, shows how the card is organized into rows, columns and zones, and describes how the card is divided into fields to accommodate specific jobs. Explains the principle of alphabetic and numeric organization of data. 1968

END OF ONE, THE: 7min J-H #5038
A wordless parable of modern society in which masses of seagulls fighting for growing mounds of garbage are intercut with the final feeble movements of a single dying bird while tractors and jet planes roar in the distance. 1970

FOCUS ON INTERPOL - INTERNATIONAL POLICE COMMISSION: 9min J-H #1452
1962

GREATER COMMUNITY ANIMAL: 7min E-H #5388
Examines why the individual has to have his idiosyncracies and his potentialities processed out of existence in order to be made acceptable to society. 1969

HOW DO WE KNOW WHAT WE KNOW: 29min C A #1268
Traces the successful communication levels of abstraction from the objects or events to high level verbal abstractions. Uses illustrations from modern philosophic work and a racing form. 1956

JOSHUA IN A BOX: 6min P-H C A #5411
A non-narrative animated film which uses the situation of a boy being trapped in a box as a basis for a study of man's needs, emotions, and values. 1970

LASER BEAM, THE: 16min J-H #4473
Discusses the laser explaining that it is a product of physics, optics and electronics. Demonstrates many types of lasers and displays their applications in medicine, industry, communications, space exploration and photography. 1968

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LASER LIGHT: 38min H-C #5418
Describes the laser light, explains how it is made and shows how it is used in such devices as the hologram. 1969

MAGIC HIGHWAY, USA: 29min J A #1771
Depicts past, present and future highways. Predicts future highways with heated cement, colored lanes, air conditioning and cantilevered construction. 1959

MAGIC IN THE AIR: 10min J-H A #1772
Uses animation to show basic principles of television.

MEGALOPOLIS - CRADLE OF THE FUTURE: 22min J A #1901
Examines the life and problems of Megalopolis, the urbanized northeastern seaboard extending from Boston to Washington, D.C. Shows metropolitan centers, transportation networks, harbors, suburban and rural areas. 1962

NEW LOOK AT AN OLD PLANET: 26min J-H C #1999
Shows the practical benefits of weather, communication, navigational, and earth resources satellites, through experiences in the lives of a Texas coastal family. Illustrates future potential uses of satellites in agriculture, oceanographic, and natural resources studies. 1969

1985 - PTS. 1, 2 & 3: 56min H #5808
A fictionalized newscast which describes the total devastation of environment, from water and air pollution to overpopulation, famine, and power failure.

NOISE - POLLUTING THE ENVIRONMENT: 15min J-H #5809
A study of noise pollution as exemplified by the problems emanating from traffic noises and the noise of airplanes in residential areas. 1971

NO. 00173: 14min H-C #5459
A butterfly, entering a room where people are worshipping machines, momentarily gains their attention, only to be killed by the supervisor, a robot, and added to his collection. 1969

PERCEPTION AND COMMUNICATION: 32min H A #4294
Gives concrete examples of how human perceptions affect the communication process and the individual's concept of reality, introduces two major theories of perception--the cognitive and the transactional. 1967

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RHINOCEROS: 11 min H-C A #4734
Uses animation to present a condensed visual translation of Ionesco's play on the theme of conformity. 1964

TEACHING THE ONE AND THE MANY: 28min CA #4765
The setting is a rural junior senior high school. The action is in the individualized learning center, illustrating how the faculty and the student body of 180 utilize men, media and machines. 1968

TELEVISION AND POLITICS: 25min J-H-C-A #5506
Outlines the history of political television commercials, beginning in 1948. Examines many campaign commercials that use Madison Avenue techniques to package and sell politicians and political consultants who plan and produce the candidates' commercials. 1971

THINKING MACHINES: 19min H-C #2900
Discusses approaches and experiments in machine "intelligence" depicts a mechanical mouse that learns by trial and error, a chess game against a giant computer and a machine that recognizes visual patterns. 1960

TIME PIECE: 8min J #4770
Zany comedy and serious comment are combined to show one man's life in today's urban "rat race". 1966

TO A NEW WORLD: 18min J-H A #2928
Tells the story of research at the RCA laboratory in New Jersey to advance radio, television, and electronics.

TRANSPORTATION IS MOVING: 11min #5882
Describes modes of transportation, with emphasis on moving people and goods. 1970

TRANSPORTATION - FOOTPATH TO AIR LANE: 16min E #3341
Traces the development of transportation in the United States since the first settlements and points out the social and economic effects during each growth period. 1965

UNDERSTANDING STRESSES AND STRAINS: 10min E-H #4482 1968

UPROOTED NATION: 22 min H-C #5744 1965

URBAN USES OF LAND FOR EDUCATION, CULTURE AND RECREATION: 18 min P-E

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VISUAL PERCEPTION: 19 min H A #3072
Dr. Hadly Cantril discusses his investigations at the perception demonstration center at Princeton University of the effects of some of our assumptions on what we see. 1959

WHAT HOLDS PEOPLE TOGETHER: 29min C A #3140
Discusses communication as man's primary means of survival. Stresses the organization of society around a physical meeting place, verbal symbols, shared perceptions and intercultural communications. 1956

WHAT IS A COMPUTER? 19min H-C #5524

WHAT IS EDUCATION - AN OXFORD DIALOGUE 15min H A #4397

YEAR 1999 A.D.: 27 min E-J-H-C-A-T #5911
Shows the house of tomorrow, including homebased computers that serve as bookkeeper, banker, shopper, entertainer, librarian, teacher, cook and maid in a look at suburbia by the turn of the century. 1967

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Films Available from the University of California Extension Media Center, Berkeley, CA 94720

COMPUTERS: CHALLENGING MAN'S SUPREMACY #8401 22min color r$25
Writer Arthur C. Clarke and several computer experts optimistically appraise future developments and uses of computers. Clarke conjectures that by the year 2000 the computer will have surpassed the capacity of the human mind in some ways, but that it will free man of many of his limitations and will help in the development of new types of consciousness. rd1972

PRIVACY: CAN YOU BUY IT? #8424
22min. color r$25
Surveys increasing sophistication and widespread use of technology for intrusion into personal privacy. Shown an expert in a boat in the middle of a large lake who explains how easily his conversation could be heard on the distant shore. Also includes a young man who studies the garbage of the rich and powerful for clues to their habits and life-styles; a polygraph expert; a stereo recording device that fits in a brassiere; and a credit agency in Atlanta that has 45 million names and records in its files. Combines serious facts with a light approach. rd1972

COMMUNICATIONS: THE WIRED WORLD #8586
22min. color r$25
Examines future communications and information storage and retrieval systems. Shows new technological developments in telephones, cable TV, satellite communications, laser systems, and computers, whose information will be accessible to households by telephone and TV. Includes interviews with Marshall McLuhan, Irving Kahn, and communications scientists and engineers. rd1971

COMMUNICATIONS AND HUMAN BEHAVIOR #6446
29min. r$11
Explores some of the research being conducted at Carnegie Tech. with electronic digital computers in an effort to evolve new theories about human mental processes. Demonstrates computer experiments with perception of motion and depth. Presents a theory of how human beings memorize. Shows how the computer helped create a new theory about human-problem solving.

COMMUNICATIONS PRIMER #4605
22min. color r$15
Simplified statement of communication theory in relation to man's responsibility for decisions, produced by Charles and Ray Eames, noted primarily for their work in industrial, home, and graphic design. From the simple beginning of the transmissions of a fact from one point to another, develops the ideas of messages and "noise" that can change the message. Discusses computers as methods of combating this noise, but incapable of taking ultimate responsibility for decisions. rd1954

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CLASS OF '01: COLLEGE OF TOMORROW #7424
25min. color r$20
Explores the use of computerized and multimedia teaching systems in the universities and colleges of the future, and the effect these systems will have on students and the concept of education itself. A look at Pennsylvania State's multimedia center shows how closed-circuit television, computers, tapes, films, and slides can deliver information to large numbers of students. New methods of teacher training and electronic methods of teaching are presented. rd1968

MEDIA: MASSAGING THE MIND #8399
22min. color r$25
Discusses future media technology, including lasers, satellites, holograms, home information centers, and other advanced electronic devices, and considers social effects of such changes. Includes interviews with William Arthur, a former editor of Look; Arnold Agnew, a former Toronto newspaper editor; Gloria Steinem, editor and social commentator, who discusses electronic image-making; and Joe McGinniss, author of The Selling of the President. rd1972

OF MEN AND MACHINES #6445
30 min. r$11
Shows some of the ways in which man handles and processes information, the problems and dynamics of information feedback between man and machines, the human being's behavior in highly complex man-machine systems, and the way in which information gained from these procedures has led to the redesign of equipment to fit human capabilities. rd1963

ULTIMATE MACHINE #8439
30min. color r$19
Introduction to computers, showing what they are, how they compare with other machines, some of their practical and experimental uses, and their possibilities--both to be hoped for and to be feared--for the future. Shows computers that are used in the automation of oil fields and production lines, that play games such as chess, that help a composer create music, and that simulate waves, drops of water, unbilt structures, and a human heart. Well-balanced study; does not lose sight of the fact that human beings design and control such machines. Sound track of original computer music. rd1971

EYE OF THE BEHOLDER

FIDELITY OF REPORT

INVISIBLE WALLS

IT'S ABOUT THIS CARPENTER

PERSON TO PERSON COMMUNICATION

RIOT MAKERS

SELLING OF THE PENTAGON

"THINKING" MACHINES

AMERICA TROPICAL

CLOSE-UP OF MARS

CONCRETE POETRY

ELECTRIC FLAG

ESSAY ON WAY

FILM GRAPHICS: ABSTRACT ASPECTS OF EDITING

FORTY SOUNDS OF ENGLISH--I/T/A

FRONTIERS IN SPACE

FUTURE SHOCK

GIRDLE ROUND THE EARTH

GOODBYE BILLY: AMERICA GOES TO WAR 1917-1918

I AM SOMEBODY

LET'S SHOOT THE DEVIL

LISTENING

LOGIC BY MACHINE

PICTOGRAPH

PROGRAMMING IN FORTRAN IV

REACHING INTO SPACE

SPIRES/BALLOTS REPORT

THIS IS MARSHALL McLUHAN: THE MEDIUM IS THE MASSAGE